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SERVICE MANUAL

MODEL: BD390

BLU-RAY DISC PLAYER
SERVICE MANUAL

MODEL: BD390

CAUTION
BEFORE SERVICING THE UNIT, READ THE “SAFETY PRECAUTIONS” IN THIS MANUAL.

P/NO : AFN73271528

OCTOBER, 2009

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SECTION 1

SUMMARY

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PRODUCT SAFETY SERVICING GUIDELINES FOR BLU-RAY DISC PLAYER PRODUCTS

IMPORTANT SAFETY NOTICE

This manual was prepared for use only by properly trained audio-video service technicians.

When servicing this product, under no circumstances should the original design be modified or altered without permission from LG Corporation. All components should be replaced only with types identical to those in the original circuit and their physical location, wiring and lead dress must conform to original layout upon completion of repairs.

Special components are also used to prevent x-radiation, shock and fire hazard. These components are indicated by the letter "x" included in their component designators and are required to maintain safe performance. No deviations are allowed without prior approval by LG Corporation.

Circuit diagrams may occasionally differ from the actual circuit used. This way, implementation of the latest safety and performance improvement changes into the set is not delayed until the new service literature is printed.

CAUTION : Do not attempt to modify this product in any way. Never perform customized installations without manufacturer's approval. Unauthorized modifications will not only void the warranty, but may lead to property damage or user injury.

Service work should be performed only after you are thoroughly familiar with these safety checks and servicing guidelines.

GRAPHIC SYMBOLS

The exclamation point within an equilateral triangle is intended to alert the service personnel to important safety information in the service literature.

The lightning flash with arrowhead symbol within an equilateral triangle is intended to alert the service personnel to the presence of non-insulated "dangerous voltage" that may be of sufficient magnitude to constitute a risk of electric shock.

The pictorial representation of a fuse and its rating within an equilateral triangle is intended to convey to the service personnel the following fuse replacement caution notice:

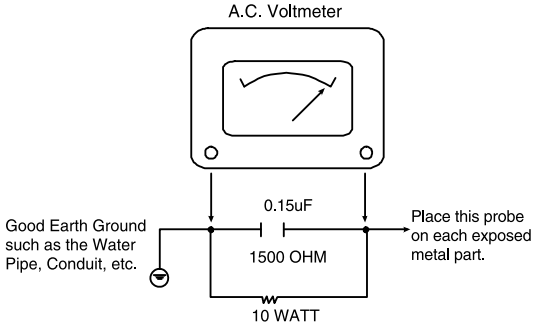
CAUTION : FOR CONTINUED PROTECTION AGAINST RISK OF FIRE, REPLACE ALL FUSES WITH THE SAME TYPE AND RATING AS MARKED NEAR EACH FUSE.

SERVICE INFORMATION

While servicing, use an isolation transformer for protection from AC line shock. After the original service problem has been corrected, make a check of the following:

FIRE AND SHOCK HAZARD

1. Be sure that all components are positioned to avoid a possibility of adjacent component shorts. This is especially important on items trans-ported to and from the repair shop.
2. Verify that all protective devices such as insulators, barriers, covers, shields, strain reliefs, power supply cords, and other hardware have been reinstalled per the original design. Be sure that the safety purpose of the polarized line plug has not been defeated.
3. Soldering must be inspected to discover possible cold solder joints, solder splashes, or sharp solder points. Be certain to remove all loose foreign particles.
4. Check for physical evidence of damage or deterioration to parts and components, for frayed leads or damaged insulation (including the AC cord), and replace if necessary.
5. No lead or component should touch a high current device or a resistor rated at 1 watt or more. Lead tension around protruding metal surfaces must be avoided.
6. After reassembly of the set, always perform an AC leakage test on all exposed metallic parts of the cabinet (the channel selector knobs, antenna terminals, handle and screws) to be sure that set is safe to operate without danger of electrical shock. DO NOT USE A LINE ISOLATION TRANSFORMER DURING THIS TEST. Use an AC voltmeter having 5000 ohms per volt or more sensitivity in the following manner: Connect a 1500 ohm, 10 watt resistor, paralleled by a .15 mfd 150V AC type capacitor between a known good earth ground water pipe, conduit, etc.) and the exposed metallic parts, one at a time. Measure the AC voltage across the combination of 1500 ohm resistor and .15 mfd capacitor. Reverse the AC plug by using a non-polarized adaptor and repeat AC voltage measurements for each exposed metallic part. Voltage measured must not exceed 0.75 volts RMS. This corresponds to 0.5 milliamp AC. Any value exceeding this limit constitutes a potential shock hazard and must be corrected immediately.



TIPS ON PROPER INSTALLATION

1. Never install any receiver in a closed-in recess, cubbyhole, or closely fitting shelf space over, or close to, a heat duct, or in the path of heated air flow.
2. Avoid conditions of high humidity such as: outdoor patio installations where dew is a factor, near steam radiators where steam leakage is a factor, etc.
3. Avoid placement where draperies may obstruct venting. The customer should also avoid the use of decorative scarves or other coverings that might obstruct ventilation.
4. Wall- and shelf-mounted installations using a commercial mounting kit must follow the factory-approved mounting instructions. A product mounted to a shelf or platform must retain its original feet (or the equivalent thickness in spacers) to provide adequate air flow across the bottom. Bolts or screws used for fasteners must not touch any parts or wiring. Perform leakage tests on customized installations.
5. Caution customers against mounting a product on a sloping shelf or in a tilted position, unless the receiver is properly secured.
6. A product on a roll-about cart should be stable in its mounting to the cart. Caution the customer on the hazards of trying to roll a cart with small casters across thresholds or deep pile carpets.
7. Caution customers against using extension cords. Explain that a forest of extensions, sprouting from a single outlet, can lead to disastrous consequences to home and family.

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SERVICING PRECAUTIONS

CAUTION: Before servicing the BLU-RAY DISC PLAYER covered by this service data and its supplements and addends, read and follow the SAFETY PRECAUTIONS. NOTE: if unforeseen circumstances create conflict between the following servicing precautions and any of the safety precautions in this publications, always follow the safety precautions.
Remember Safety First :

General Servicing Precautions

1. Always unplug the BLU-RAY DISC PLAYER AC power cord from the AC power source before:
   (1) Removing or reinstalling any component, circuit board, module, or any other assembly.
   (2) Disconnecting or reconnecting any internal electrical plug or other electrical connection.
   (3) Connecting a test substitute in parallel with an electrolytic capacitor.
   Caution : A wrong part substitution or incorrect polarity installation of electrolytic capacitors may result in an explosion hazard.

2. Do not spray chemicals on or near this BLU-RAY DISC PLAYER or any of its assemblies.

3. Unless specified otherwise in this service data, clean electrical contacts by applying an appropriate contact cleaning solution to the contacts with a pipe cleaner, cotton-tipped swab, or comparable soft applicator.
   Unless specified otherwise in this service data, lubrication of contacts is not required.

4. Do not defeat any plug/socket B+ voltage interlocks with whitch instruments covered by this service manual might be equipped.

5. Do not apply AC power to this BLU-RAY DISC PLAYER and / or any of its electrical assemblies unless all solidstate device heat sinks are correctly installed.

6. Always connect the test instrument ground lead to an appropriate ground before connecting the test instrument positive lead. Always remove the test instrument ground lead last.

Insulation Checking Procedure

Disconnect the attachment plug from the AC outlet and turn the power on. Connect an insulation resistance meter (500V) to the blades of the attachment plug. The insulation resistance between each blade of the attachment plug and accessible conductive parts (Note 1) should be more than 1Mohm.
Note 1 : Accessible Conductive Parts include Metal panels, Input terminals, Earphone jacks,etc.

Electrostatically Sensitive (ES) Devices

Some semiconductor (solid state) devices can be damaged easily by static electricity. Such components commonly are called Electrostatically Sensitive (ES) Devices. Examples of typical ES devices are integrated circuits and some field effect transistors and semiconductor chip components.
The following techniques should be used to help reduce the incidence of component damage caused by static electricity.

1. Immediately before handling any semiconductor component or semiconductor-equipped assembly, drain off any electrostatic charge on your body by touching a known earth ground. Alternatively, obtain and wear a commercially available discharging wrist strap device, which should be removed for potential shock reasons prior to applying power to the unit under test.

2. After removing an electrical assembly equipped with ES devices, place the assembly on a conductive surface such as aluminum foil, to prevent electrostatic charge buildup or exposure of the assembly.

3. Use only a grounded-tip soldering iron to solder or unsolder ES devices.

4. Use only an anti-static solder removal device. Some solder removal devices not classified as “anti-static” can generate electrical charges sufficient to damage ES devices.

5. Do not use freon-propelled chemicals. These can generate an electrical charge sufficient to damage ES devices.

6. Do not remove a replacement ES device from its protective package until immediately before you are ready to install it. (Most replacement ES devices are packaged with leads electrically shorted together by conductive foam, aluminum foil,or comparable conductive material).

7. Immediately before removing the protective material from the leads of a replacement ES device, touch the protective material to the chassis or circuit assembly into which the device will be installed.

   Caution: Be sure no power is applied to the chassis or circuit, and observe all other safety precautions.

8. Minimize bodily motions when handling unpackaged replacement ES devices. (Normally harmless motion such as the brushing together of your clothes fabric or the lifting of your foot from a carpeted floor can generate static electricity sufficient to damage an ES device.)

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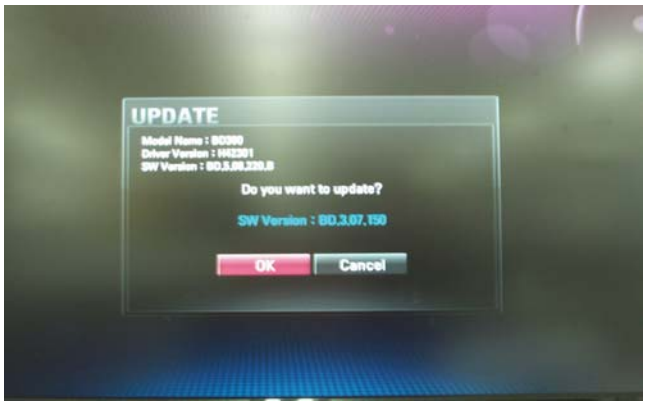
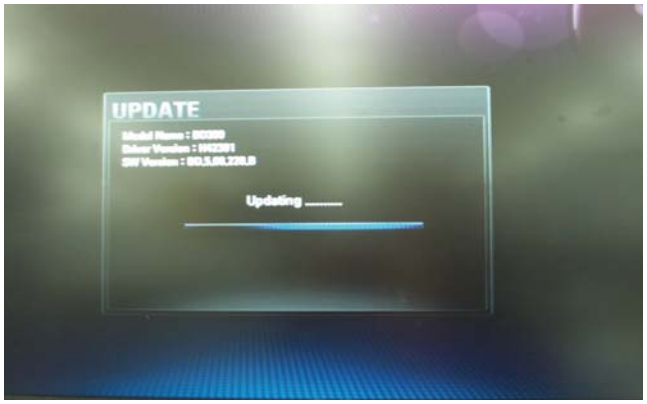
SOFTWARE UPGRADE

- Burn a DVD recordable disc or USB with a file that is named to “LG_BD_390VBB.ROM”.
- Insert a upgrading disc or USB.
- Show help message for disc upgrade as follows.
  < in the case of Back End program & Front End program >



Press play key to upgrade and it will show progress information



After completing upgrade then power is off.

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SPECIFICATIONS

• GENERAL

Power requirements:	AC 200-240V, 50/60Hz
Power consumption:	21W
Dimensions (W x H x D):	Approx. 16.9 x 2.3 x 10.9 inches (430 x 58 x 277mm) without feet
Weight (Approx.):	3kg (6.6lbs)
Operating temperature:	41°F to 95°F (5°C to 35°C)
Operating humidity:	5% to 90%

• OUTPUTS

VIDEO OUT:	1.0V (p-p), 75Ω, sync negative, RCA jack x 1
COMPONENT VIDEO OUT:	(Y) 1.0V (p-p), 75Ω,negative sync, RCA jack x 1 (Pb)/(Pr) 0.7V (p-p), 75Ω, RCA jack x 2
HDMI OUT (video/audio):	19pin (HDMI standard, Type A)
ANALOG AUDIO OUT:	2.0Vrms (1kHz, 0dB), 600Ω, RCA jack (L, R) x 1
DIGITAL OUT (OPTICAL):	3V (p-p), Optical jack x 1
DIGITAL OUT (COAXIAL):	0.5V (p-p), 75Ω, RCA jack x 1
MULTI CHANNEL OUT:	2.0Vrms (1kHz, 0dB), 600Ω, RCA jack x 8

• SYSTEM

Laser:	Semiconductor laser, wavelength: 405nm / 650nm
Signal system:	Standard NTSC Color TV system
Frequency response:	20Hz to 20kHz
Signal-to-noise ratio:	More than 100dB (ANALOG OUT connectors only)
Harmonic distortion:	Less than 0.008%
Dynamic range:	More than 95dB
LAN port:	Ethernet jack x 1, 10BASE-T/100BASE-TX

Note : Design and specifications are subject to change prior notice.

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SECTION 2

CABINET & MAIN CHASSIS

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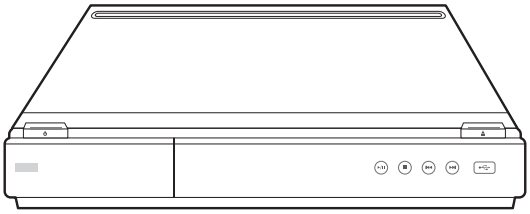
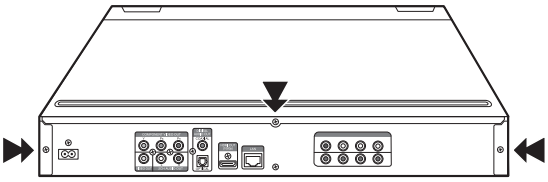
DISASSEMBLY INSTRUCTIONS

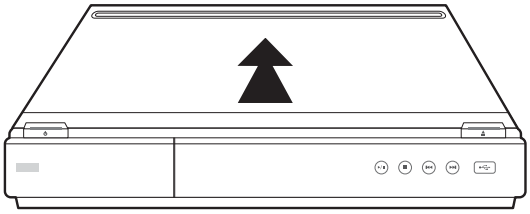
1. It is the product appearance.



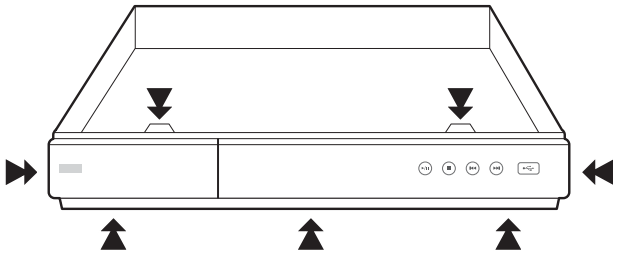
2. Remove the three screws on the back panel to seperate the top cover.



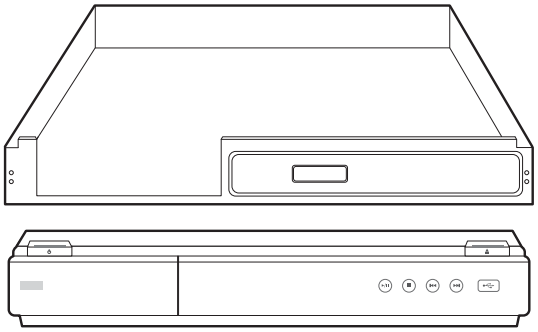
3. Push the top cover backward to seperate the top cover completely.



4. Remove the seven front panel hooks (two hooks on the top, two hooks on the both side and three hooks on the bottom) to seperate the front panel.



5. It is the feature that the top and front panel are seperated.



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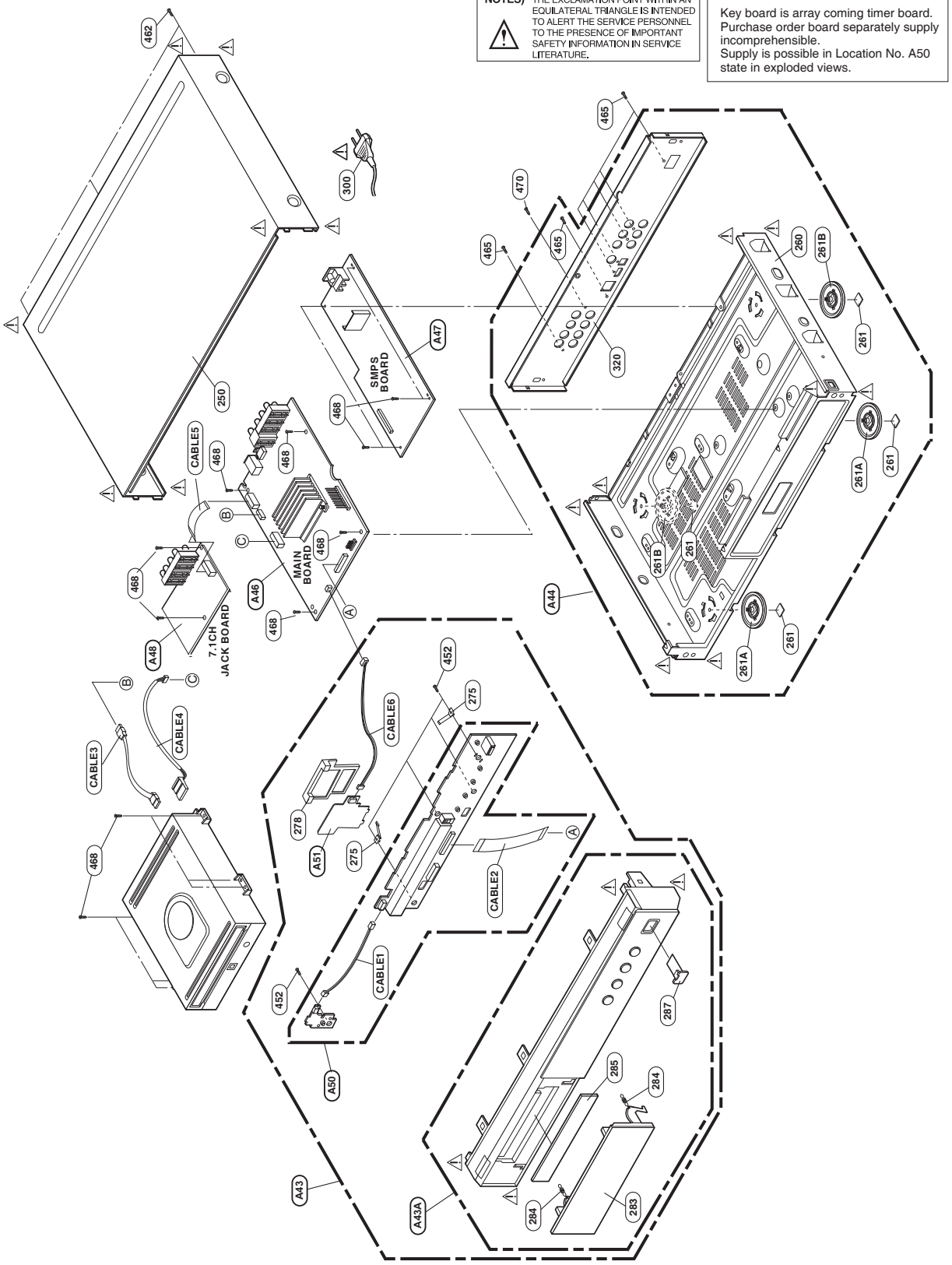
EXPLODED VIEWS

1. CABINET AND MAIN FRAME SECTION

NOTES) THE EXCLAMATION POINT WITHIN AN EQUILATERAL TRIANGLE IS INTENDED TO ALERT THE SERVICE PERSONNEL TO THE PRESENCE OF IMPORTANT SAFETY INFORMATION IN SERVICE LITERATURE.

SVC purchase order caution

Key board is array coming timer board.
Purchase order board separately supply incomprehensible.
Supply is possible in Location No. A50 state in exploded views.



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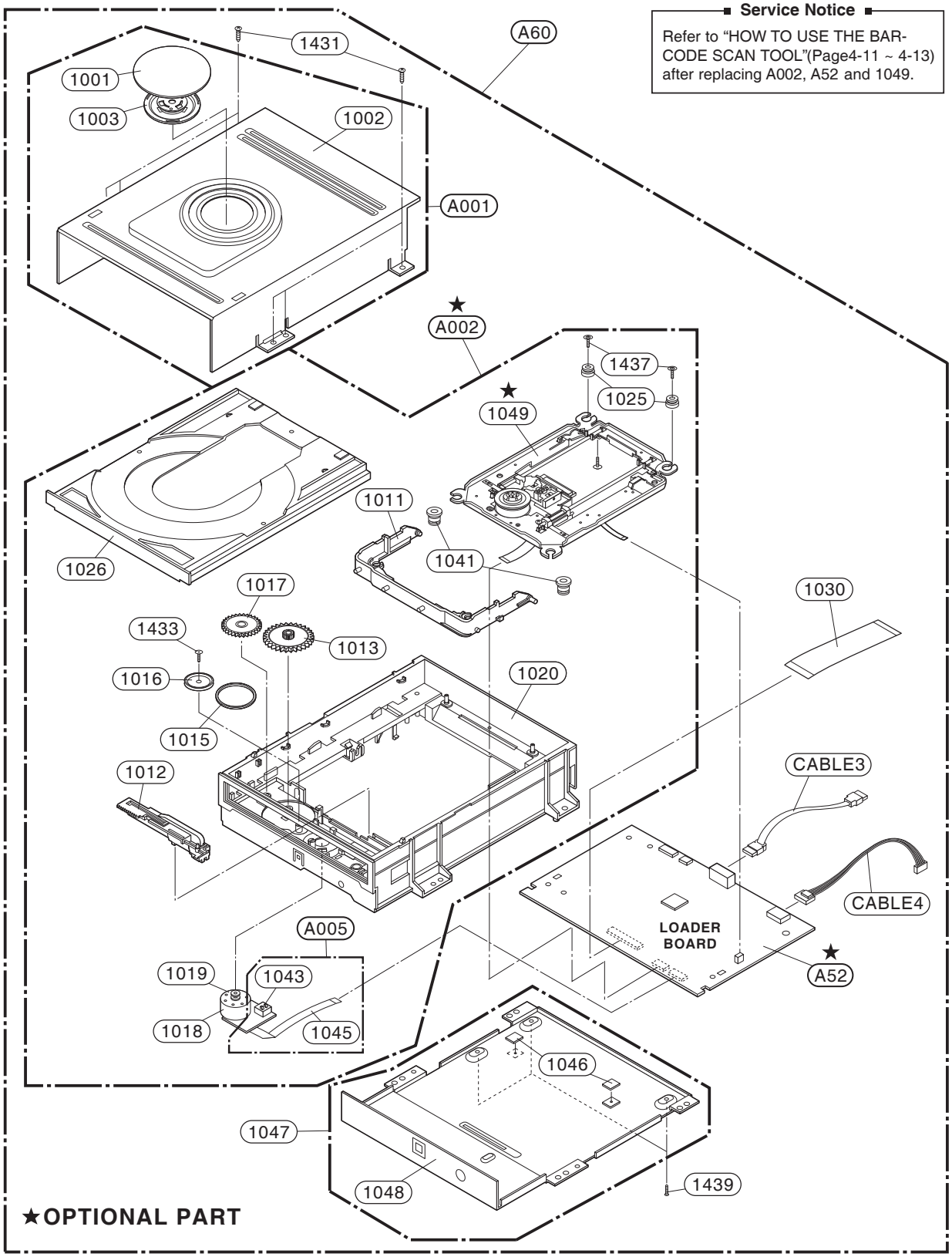
2. DECK MECHANISM SECTION (HL-05P)



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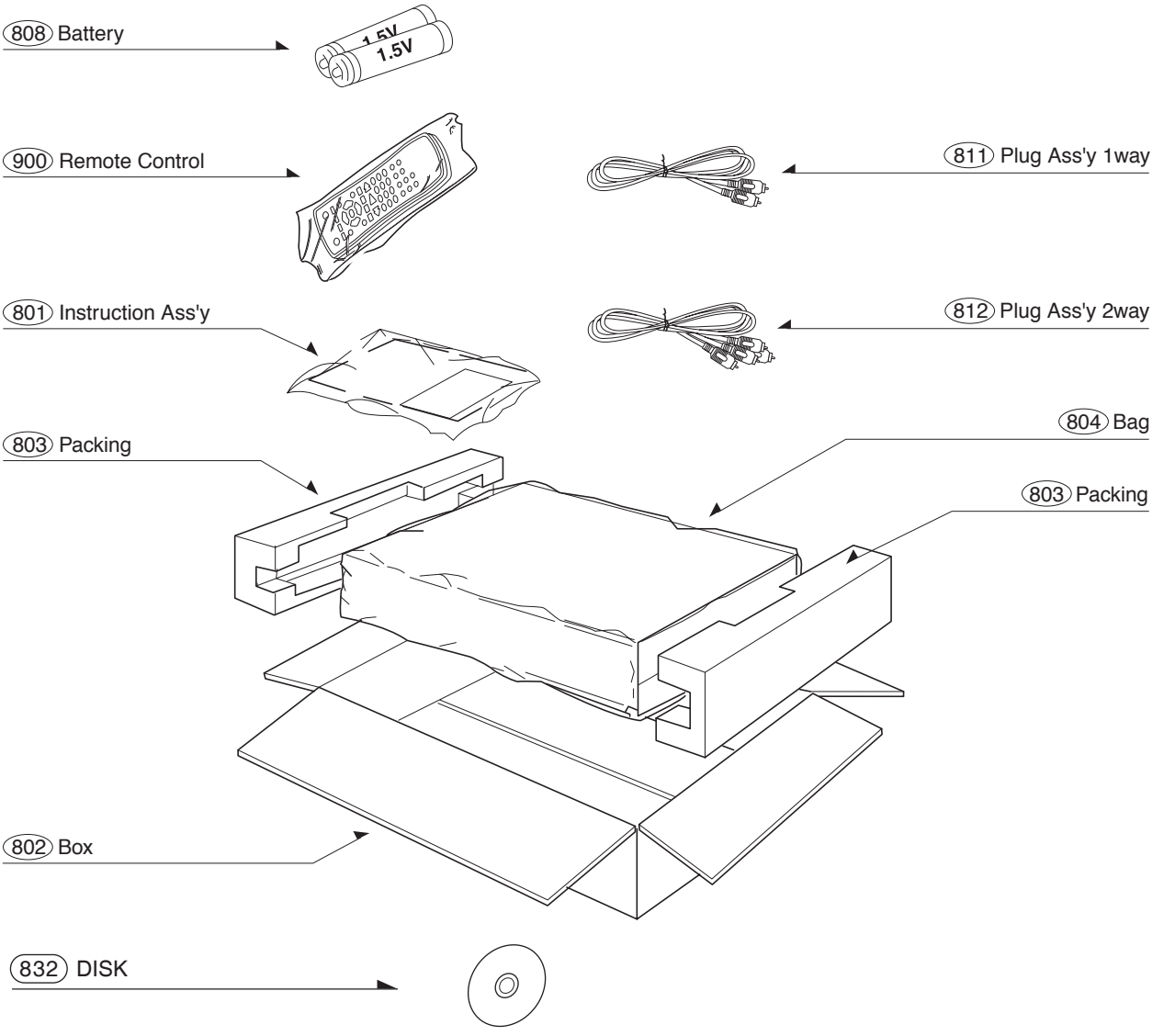
3. PACKING ACCESSORY SECTION



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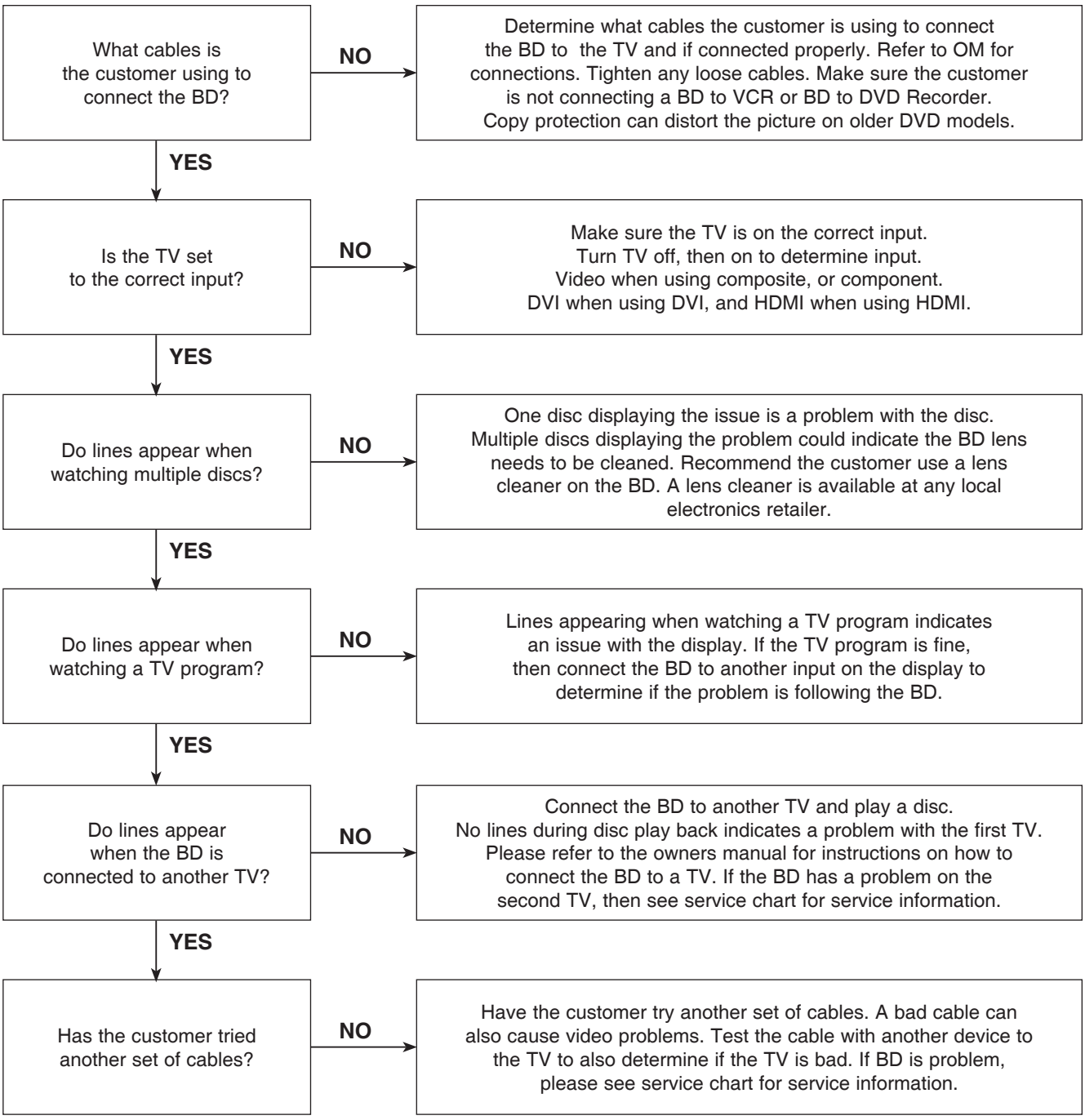
TRAINING MASTER FOR BLU-RAY (BD)

Objective: To provide clear and concise guidelines for customer service agents to handle calls on box goods calls.

1. DISTORTED PICTURE

1-1. Lines on Picture

Distorted picture refers to the customer getting video, but there is a problem with the video.



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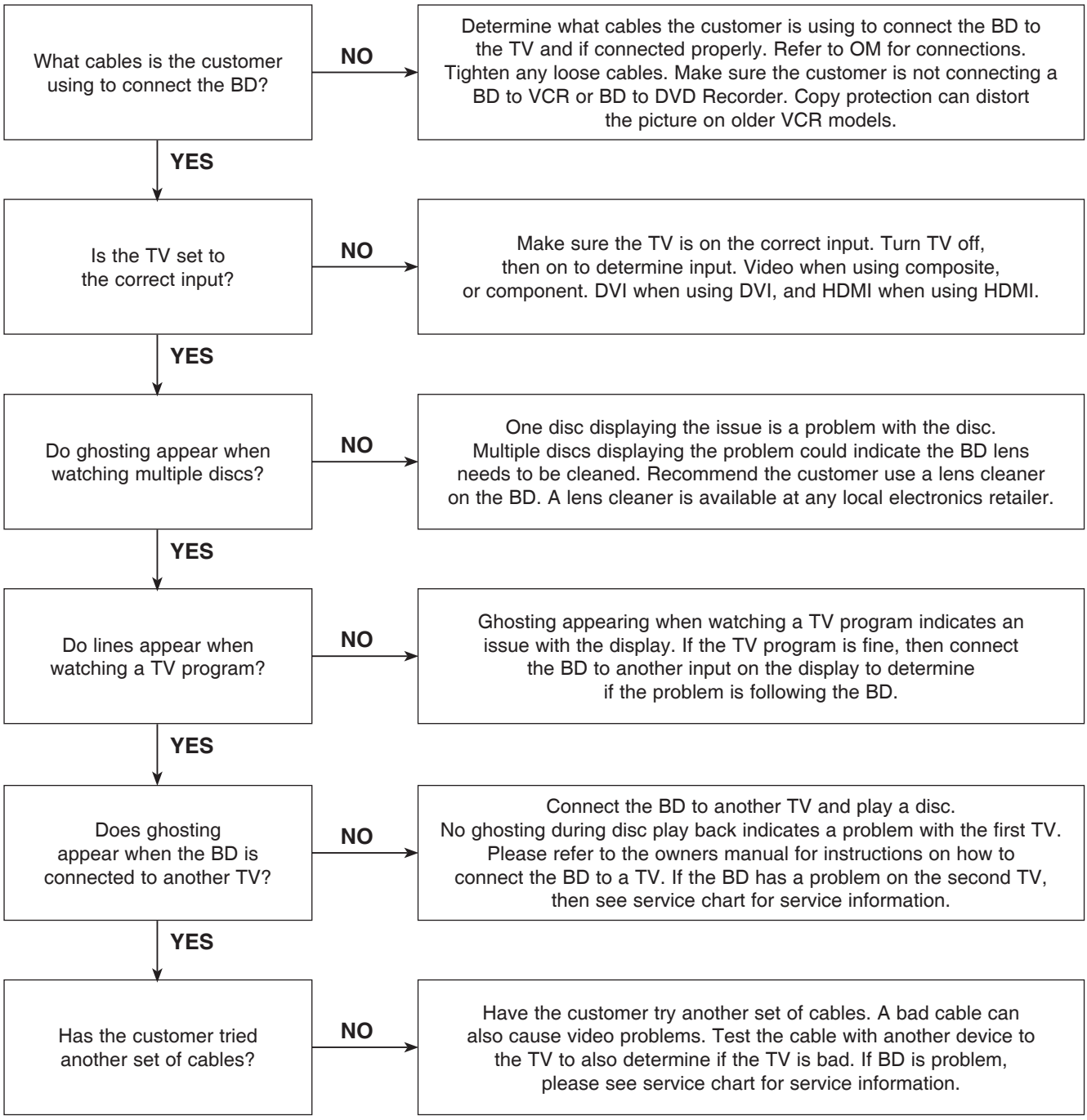
TRAINING MASTER FOR BLU-RAY (BD)

1-2. Ghost Picture

Distorted picture refers to the customer getting video, but there is a problem with the video.



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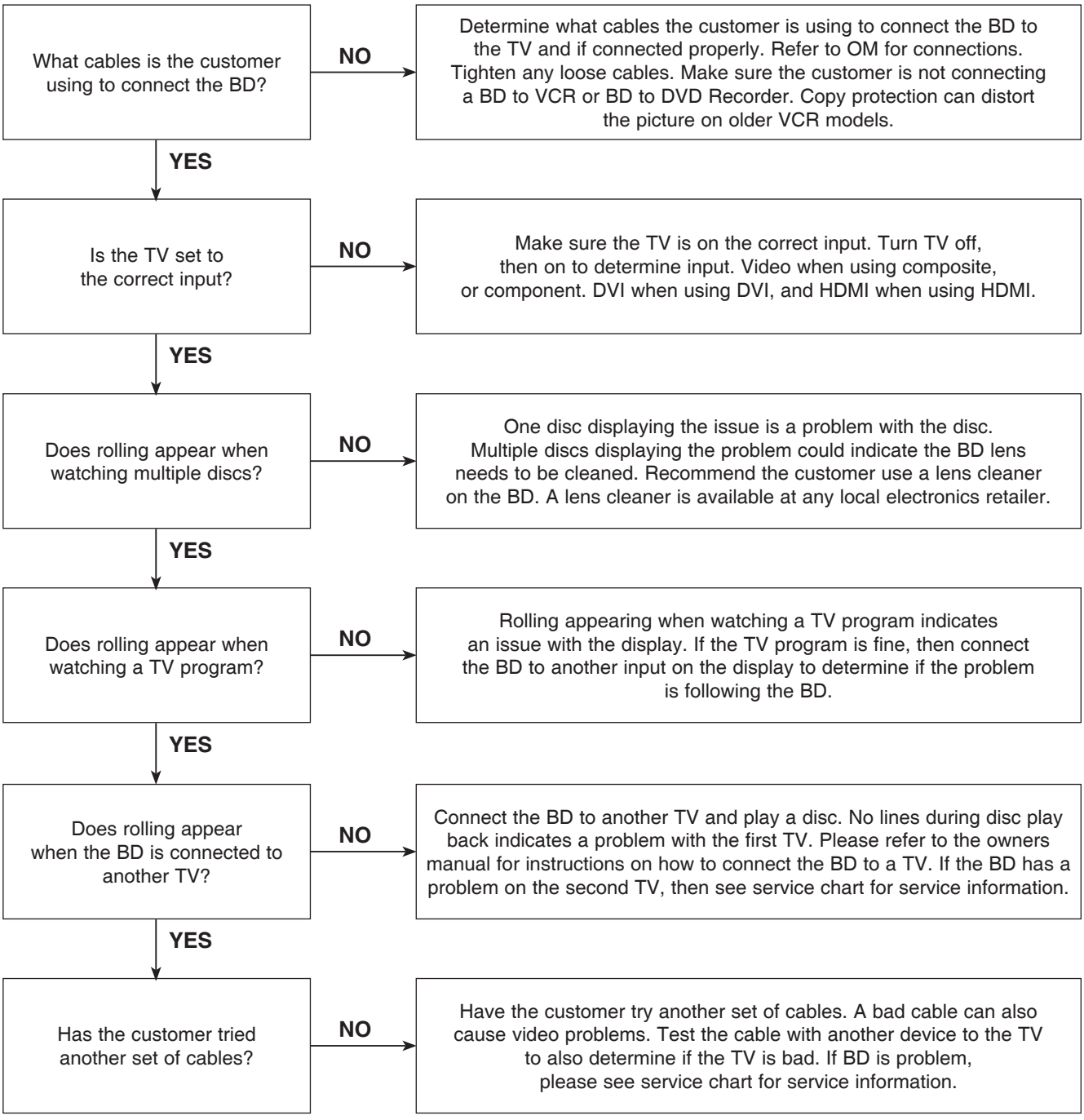
1-3. Rolling Picture

Distorted picture refers to the customer getting video, but there is a problem with the video.



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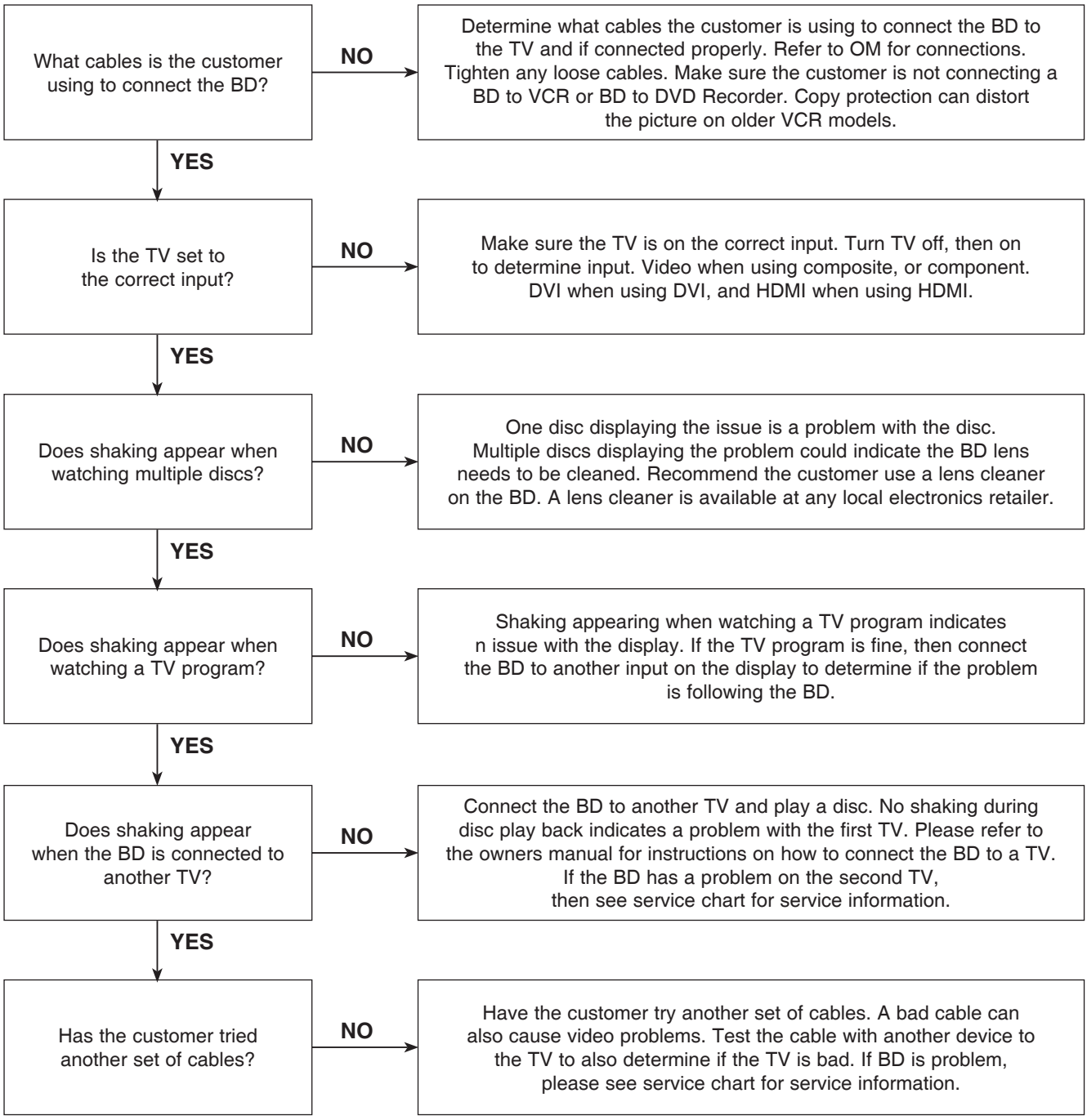
TRAINING MASTER FOR BLU-RAY (BD)

1-4. Shaky Picture

Distorted picture refers to the customer getting video, but there is a problem with the video.



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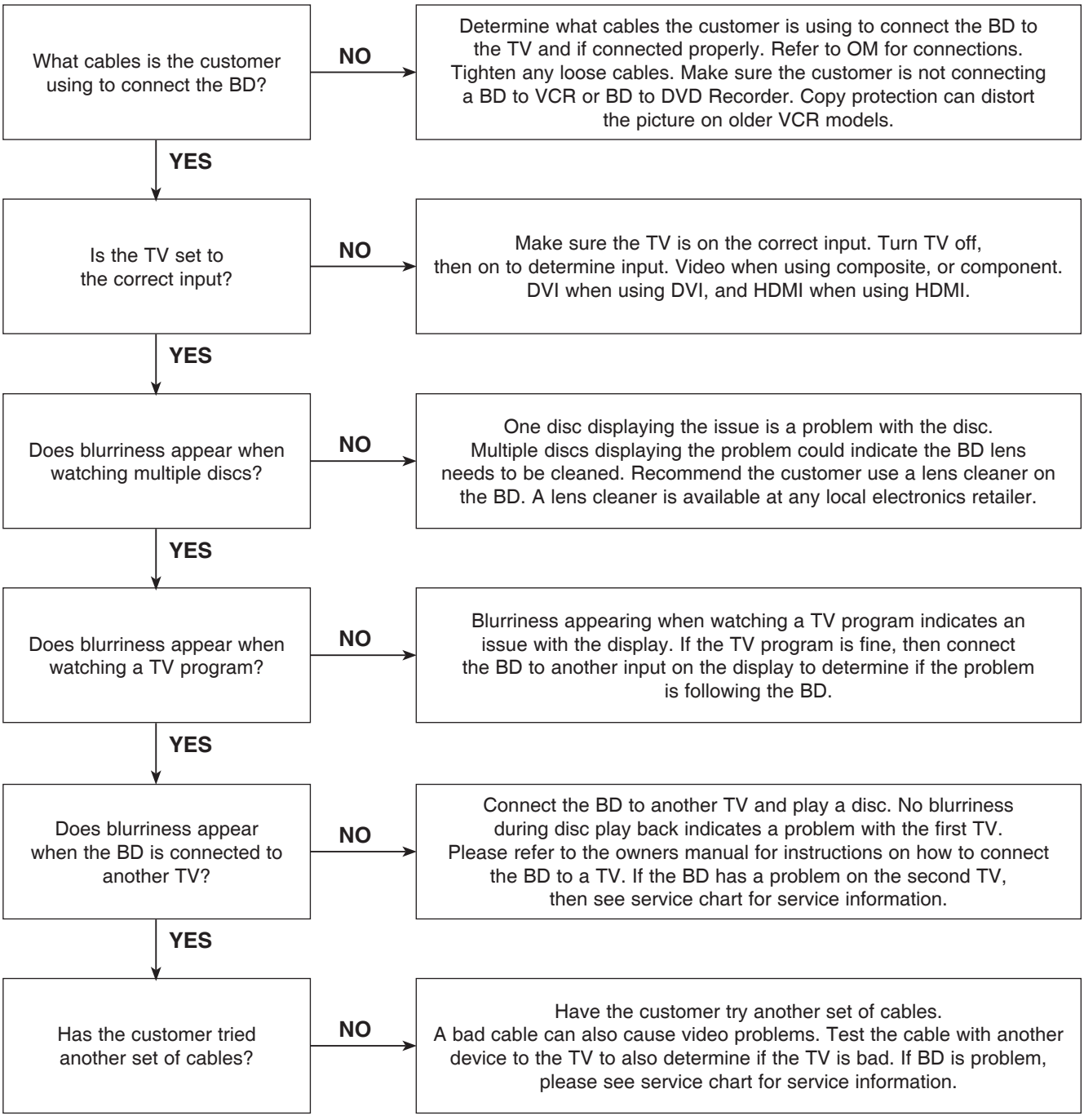
1-5. Blurry Picture

Distorted picture refers to the customer getting video, but there is a problem with the video.



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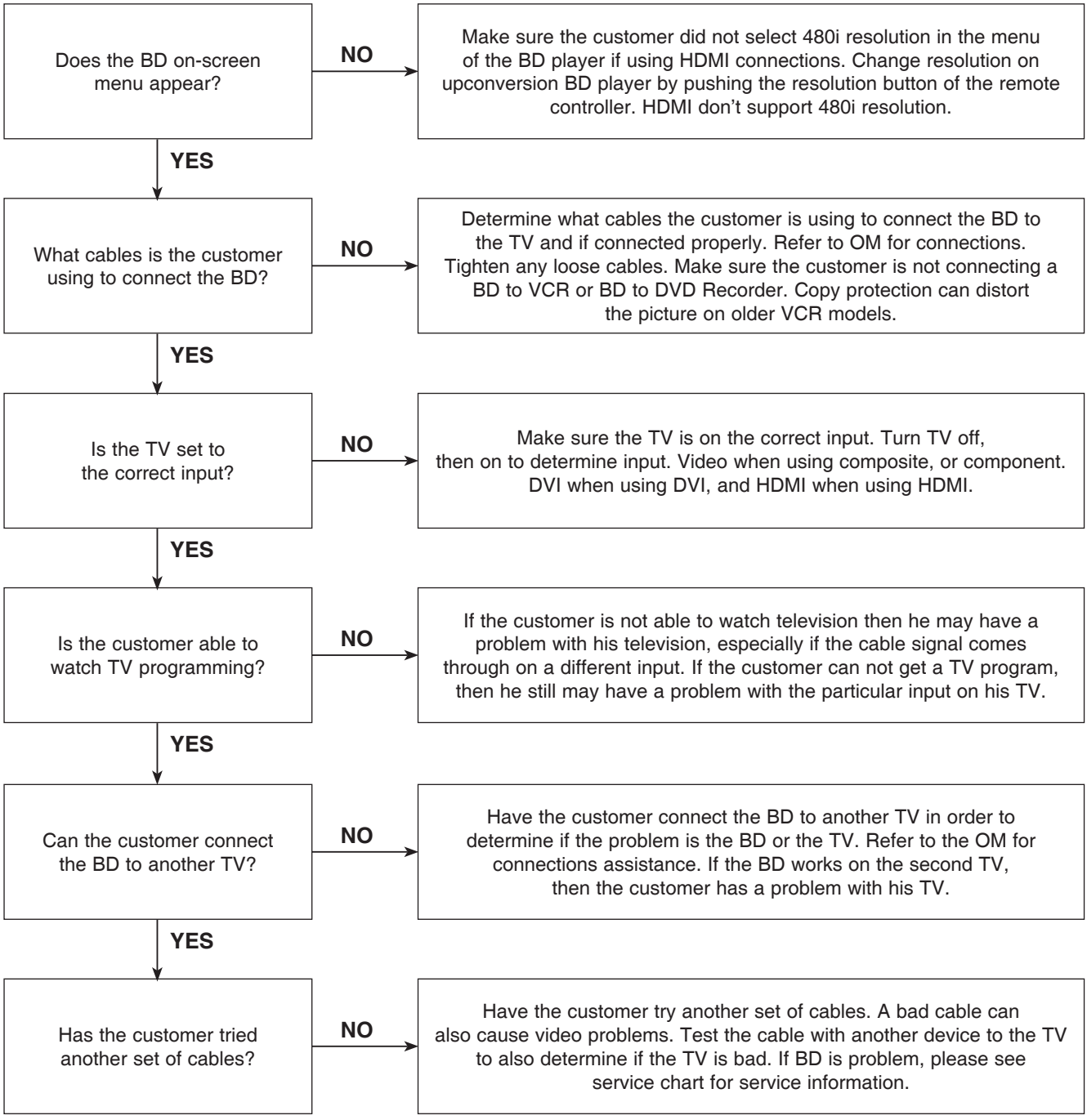
2. NO PICTURE

2-1. Black Screen

The entire screen is black.



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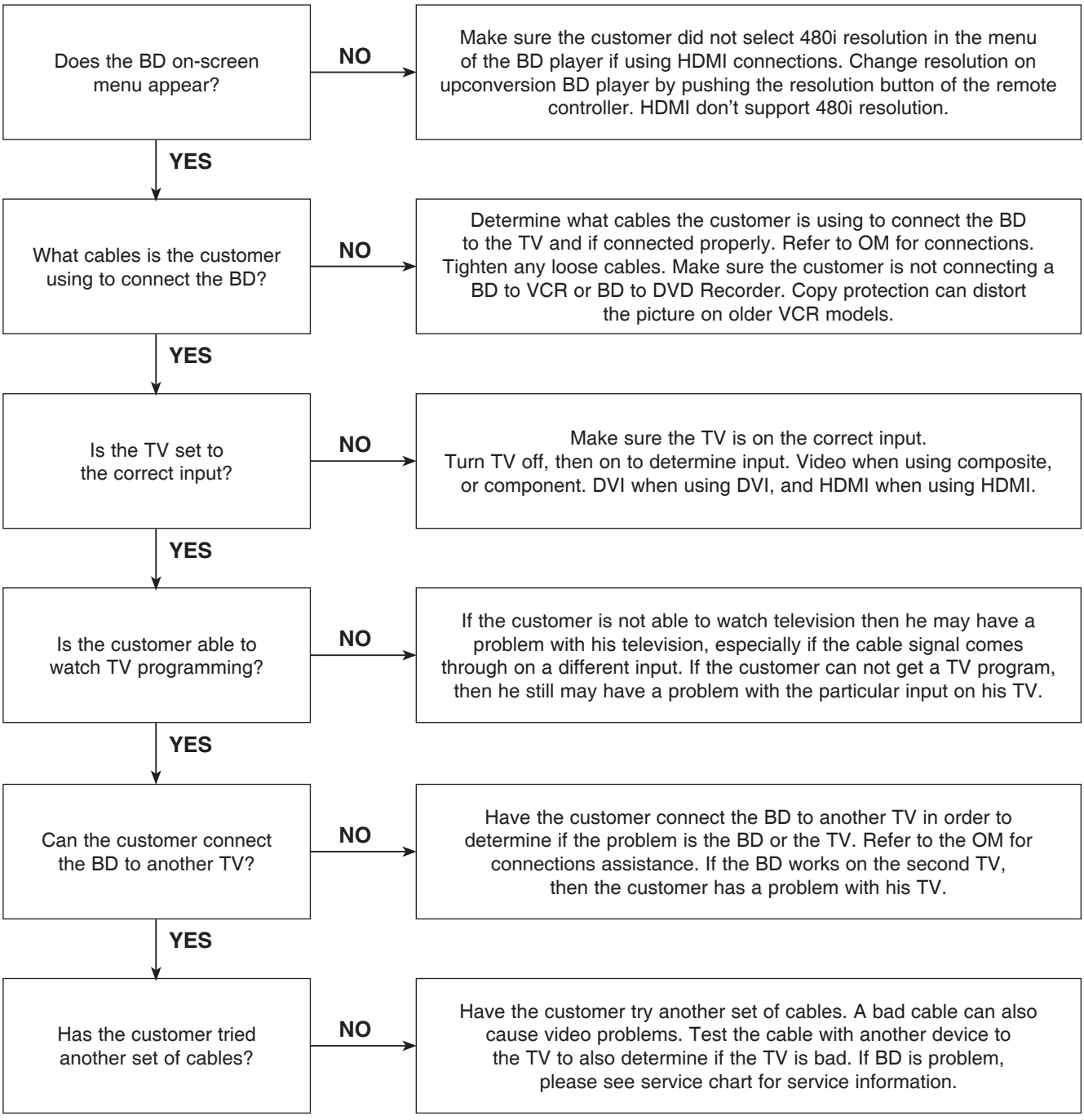
TRAINING MASTER FOR BLU-RAY (BD)

2-2. Blue Screen

The entire screen is a solid blue color.



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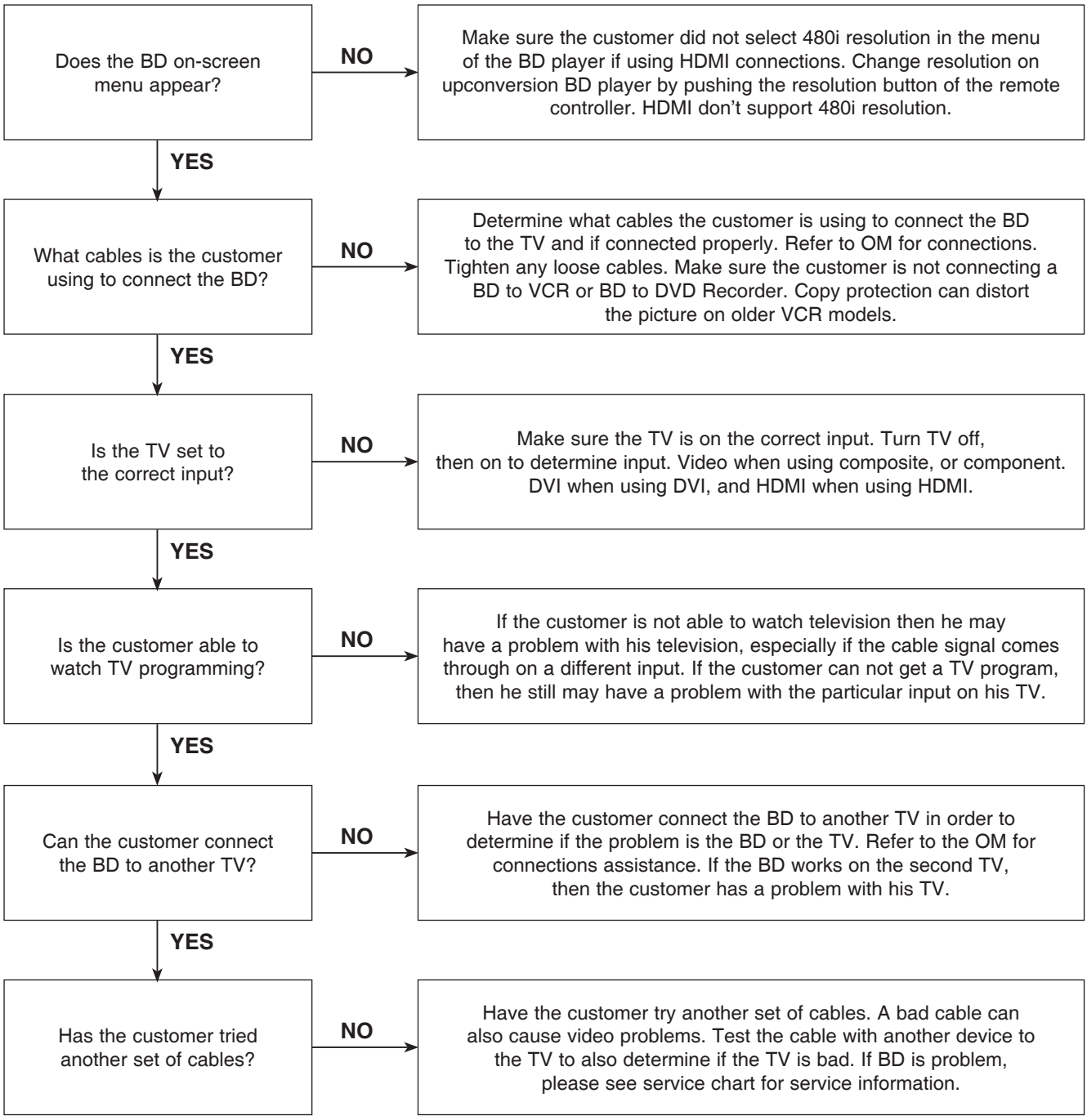
2-3. Snowy Screen

A snowy picture is when black and white dots are all over the screen.



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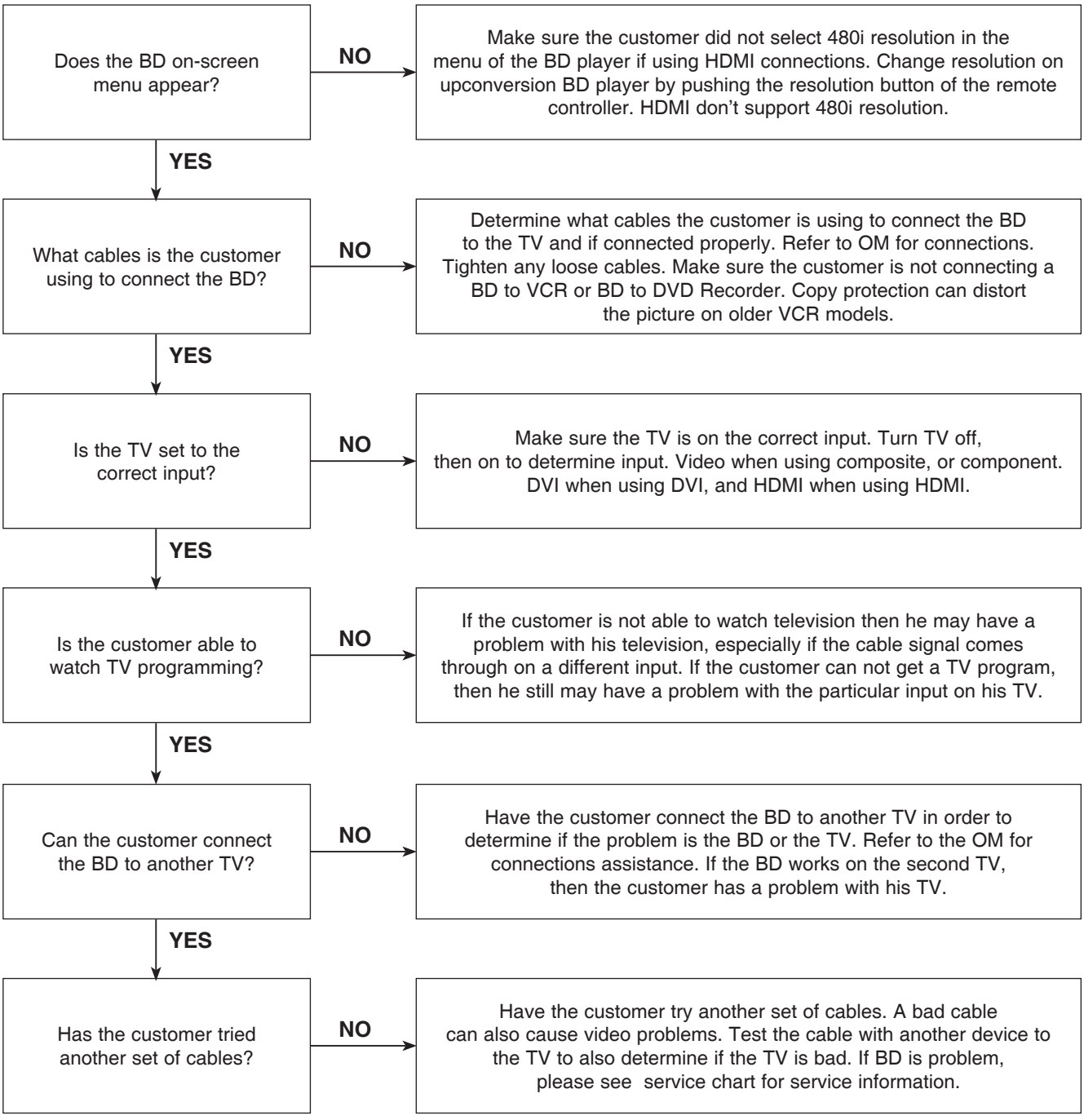
TRAINING MASTER FOR BLU-RAY (BD)

2-4. No Signal

A “no signal” message appears on the screen of the display.



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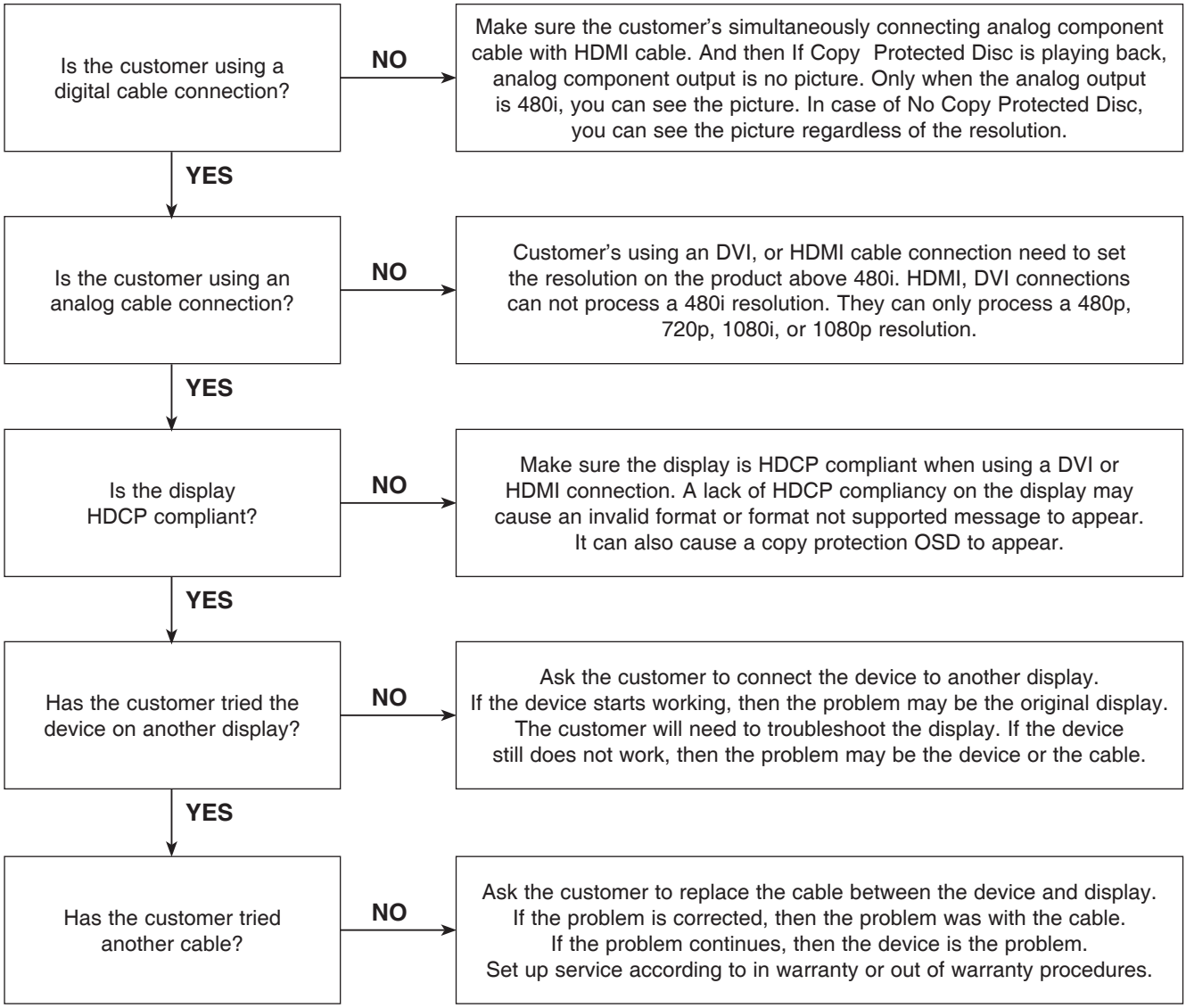
2-5. Invalid Format or Format Not Supported



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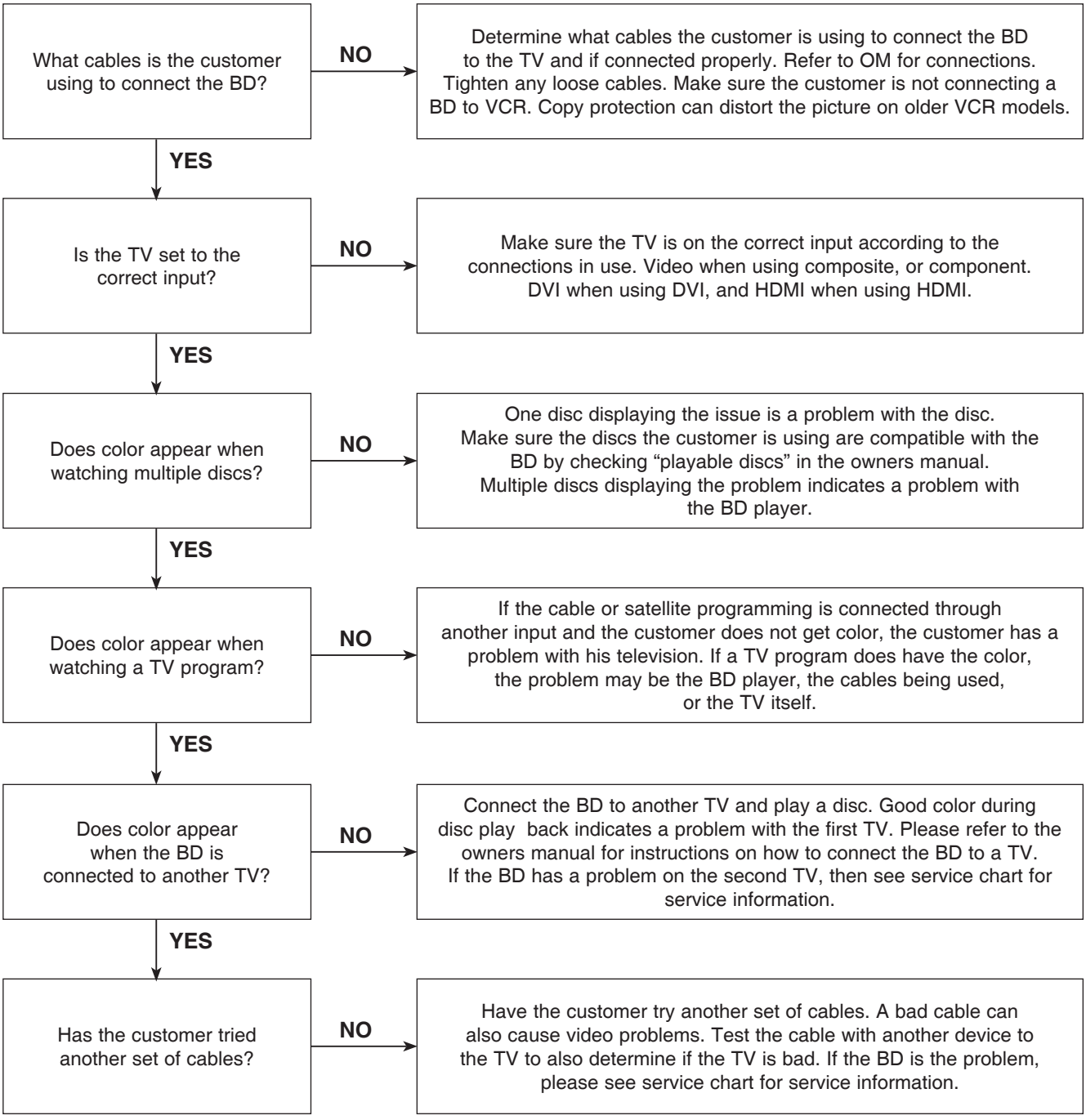
TRAINING MASTER FOR BLU-RAY (BD)

3. PICTURE COLOR

3-1. No Color

The video displays no color and only shows in black and white.



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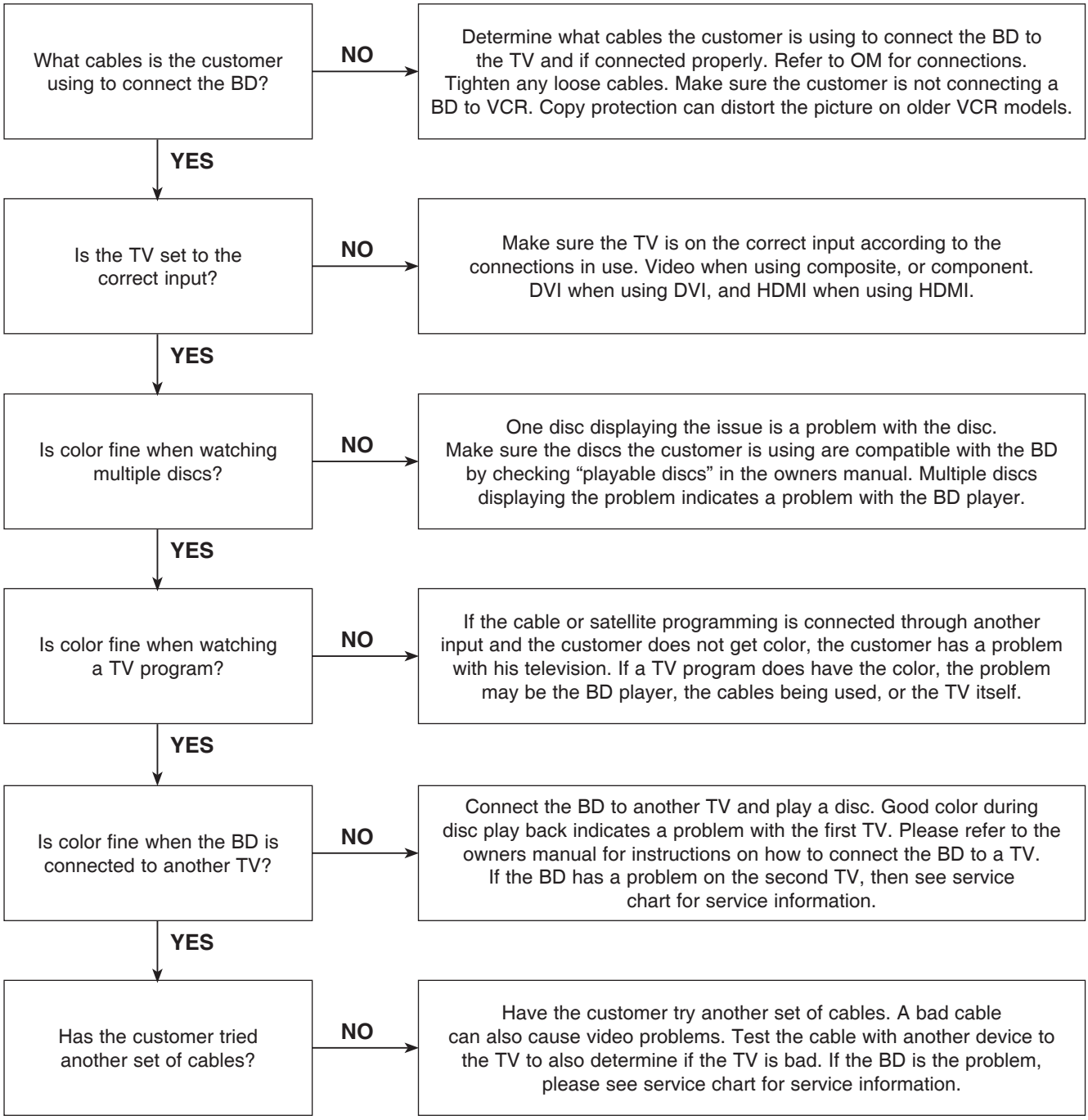
TRAINING MASTER FOR BLU-RAY (BD)

3-2. Poor Color

The color is poor. Examples would be washed out colors, colors bleeding into one another, or a solid tint to a screen.



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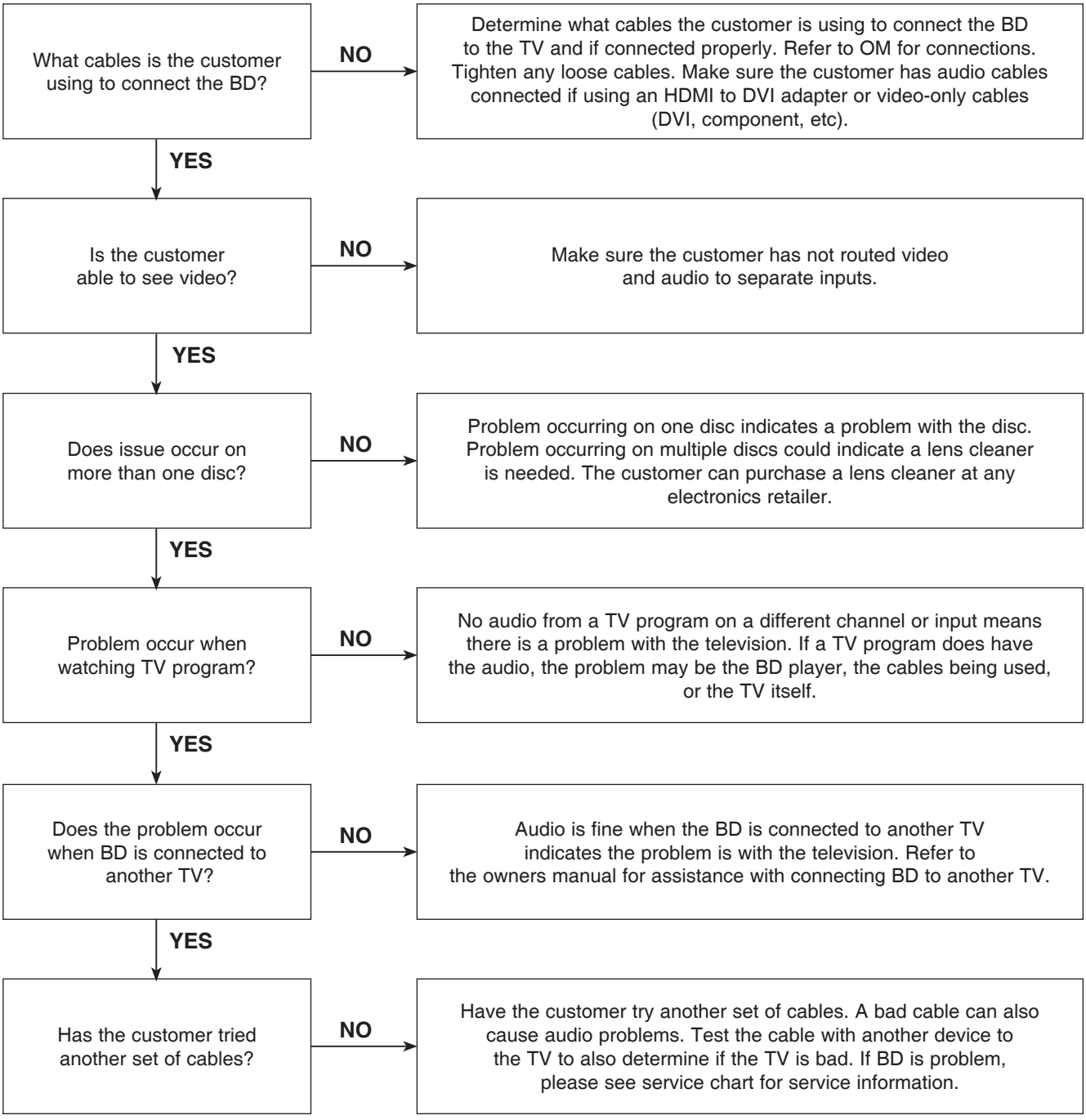
TRAINING MASTER FOR BLU-RAY (BD)

4. NOISE/AUDIO PROBLEMS

4-1. No Audio

The customer is not able to get audio.



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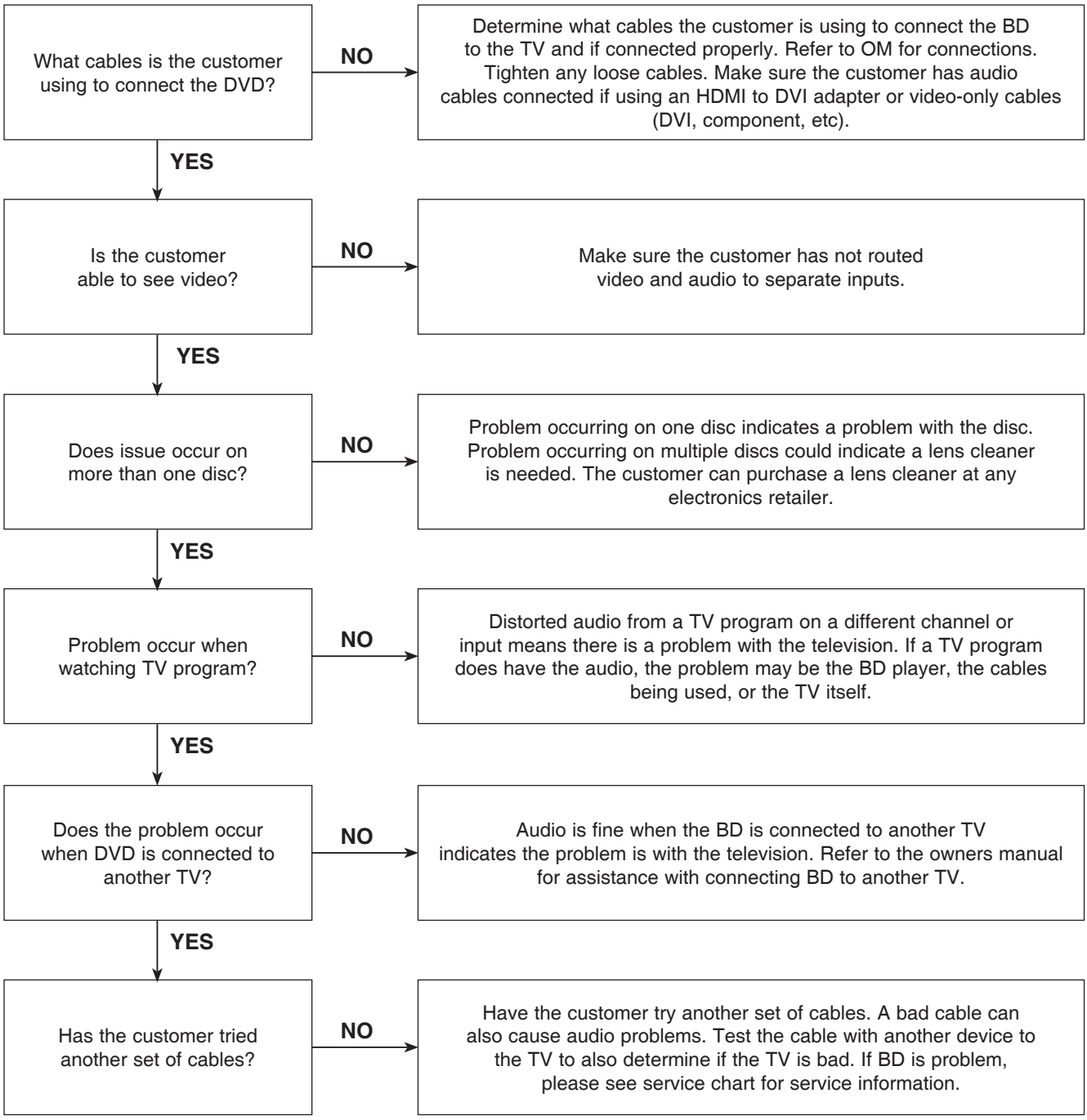
4-2. Distorted Audio

The audio sounds muffled, scratchy, or the audio skips.



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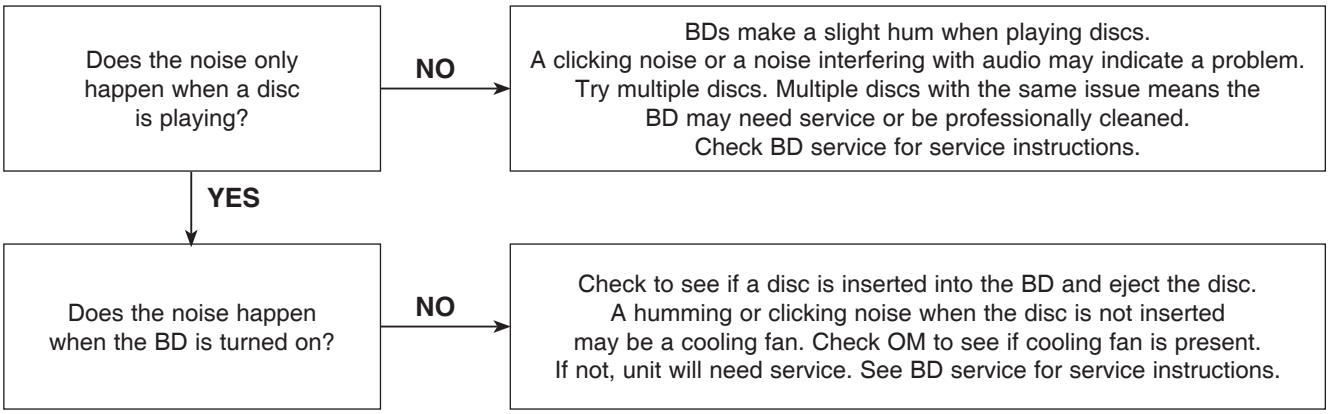
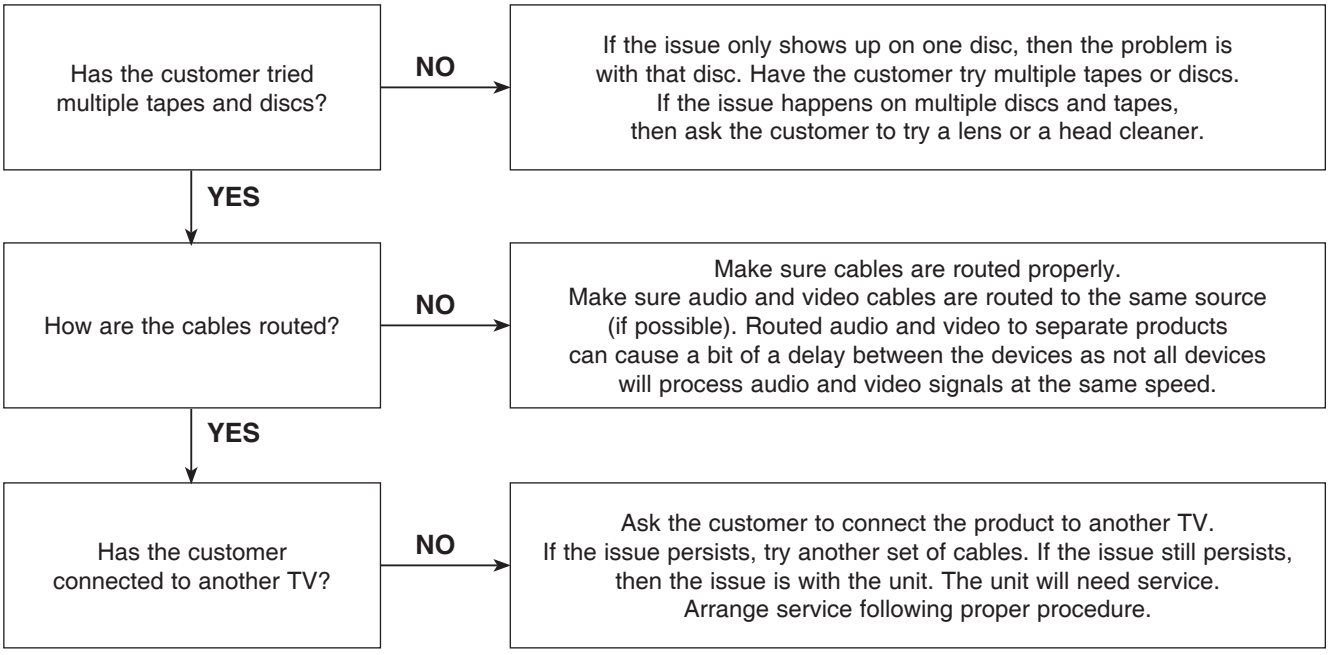
4-3. Humming/Clicking Noise

The unit is making a humming noise or a clicking noise.



4-4. Audio/Video Out of Synch

The audio and video do not match up. People look to be talking, but their voices are delayed by a few seconds.



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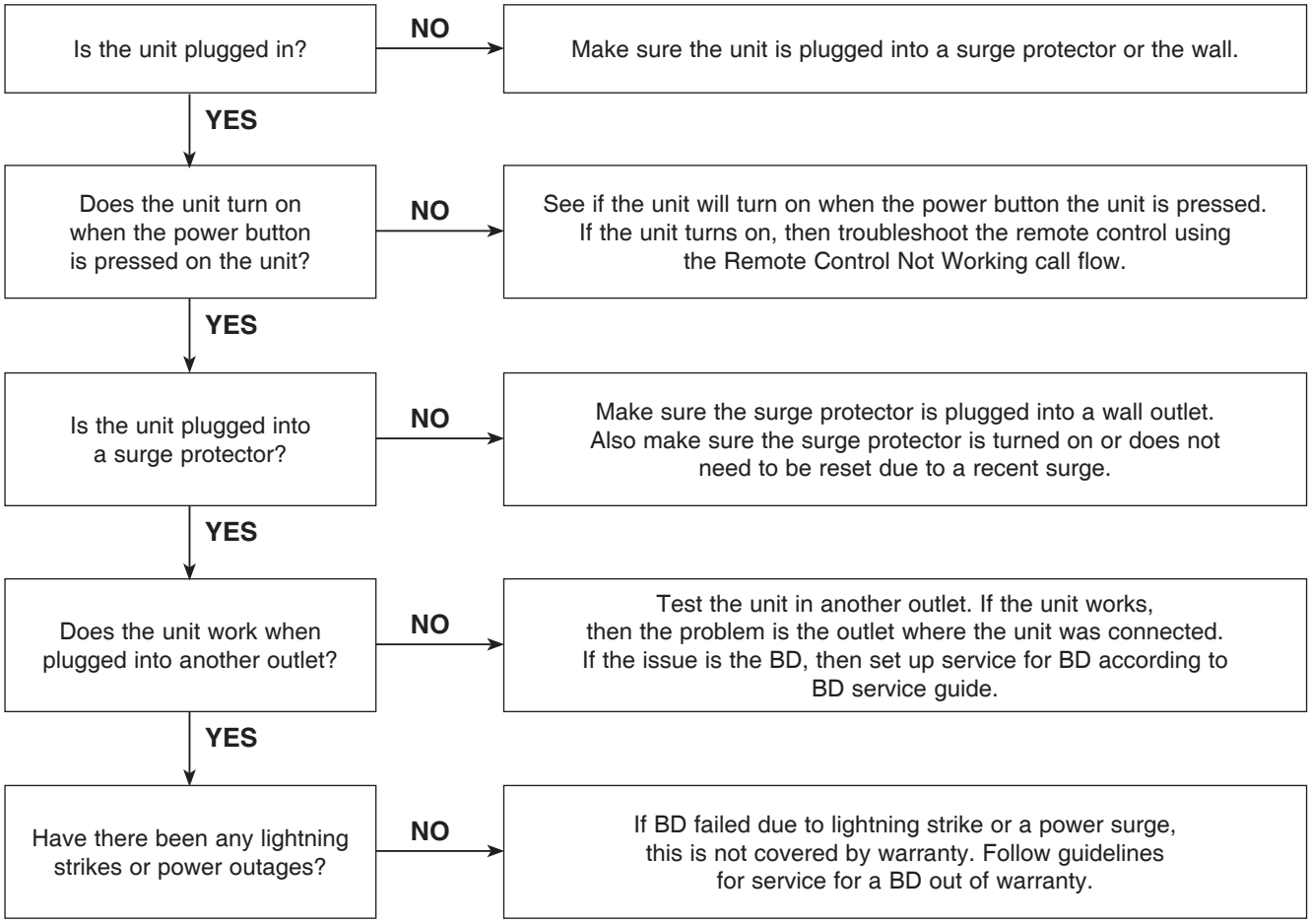
5. MISCELLANEOUS

5-1. No Power

The unit will not turn on.



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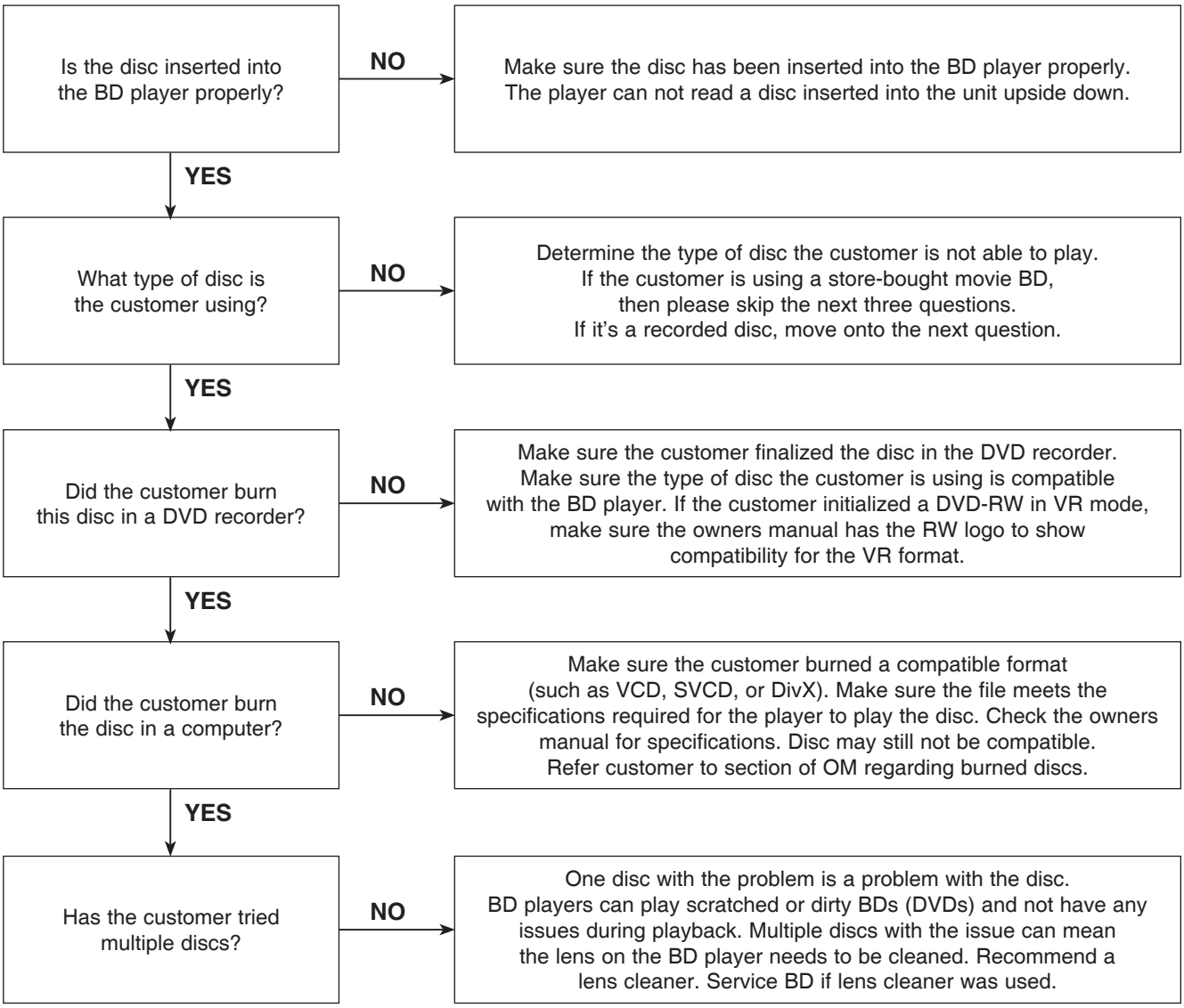
5-2. Disc Error

The unit displays “disc error” when a disc is inserted into the BD player.



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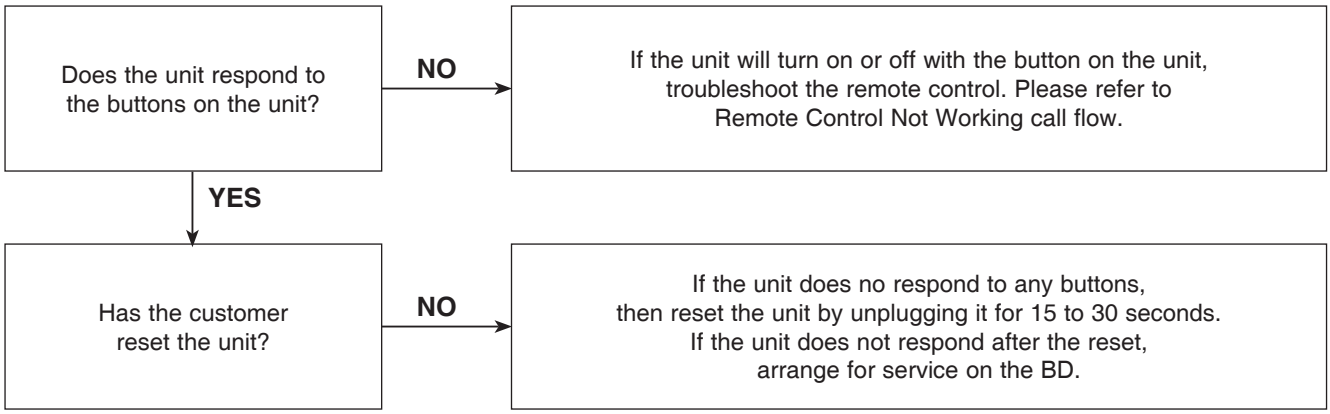
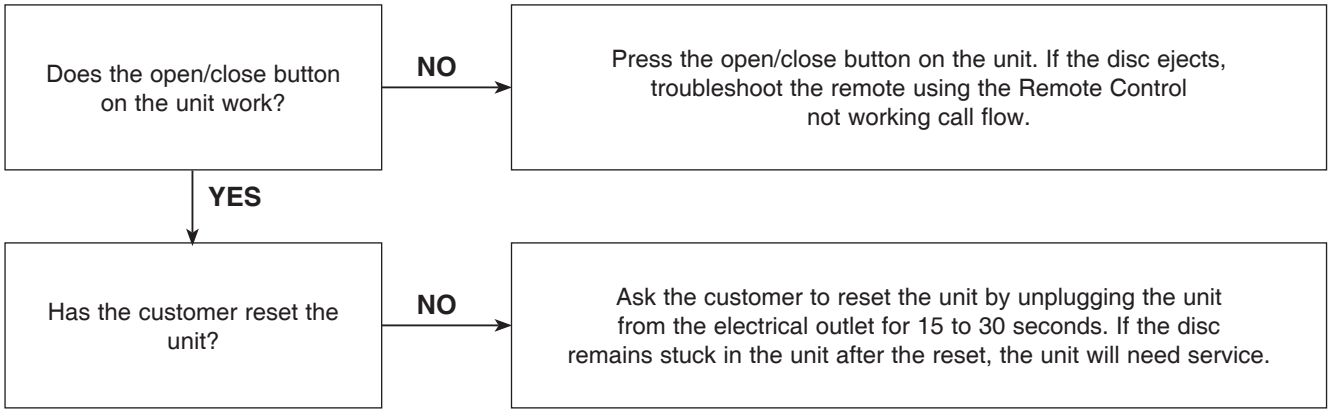
5-3. Unit Locks Up

Unit does not respond to any commands.



5-4. Disc Stuck

A BD disc is stuck in the unit.



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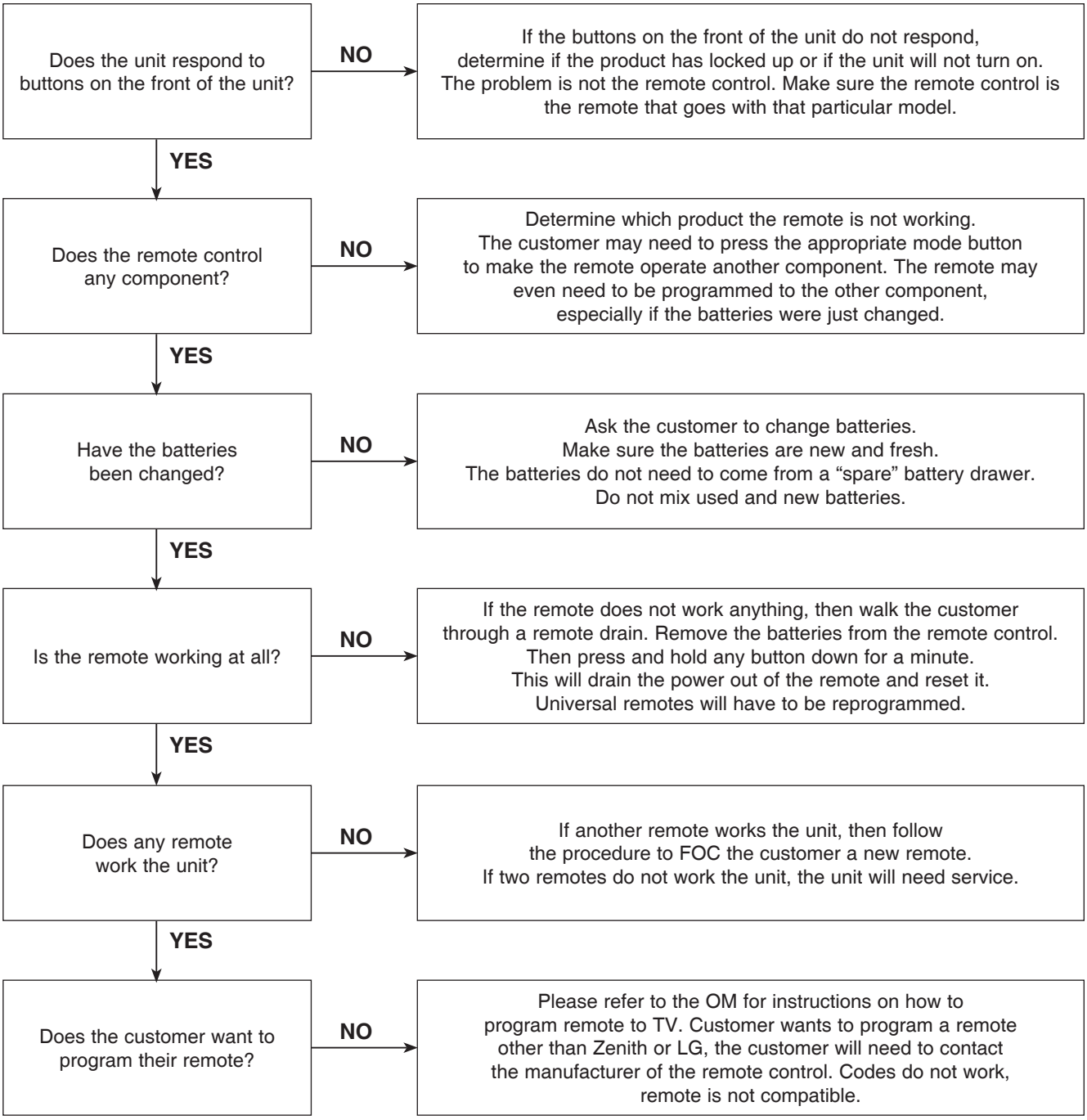
5-5. Remote Control Not Working



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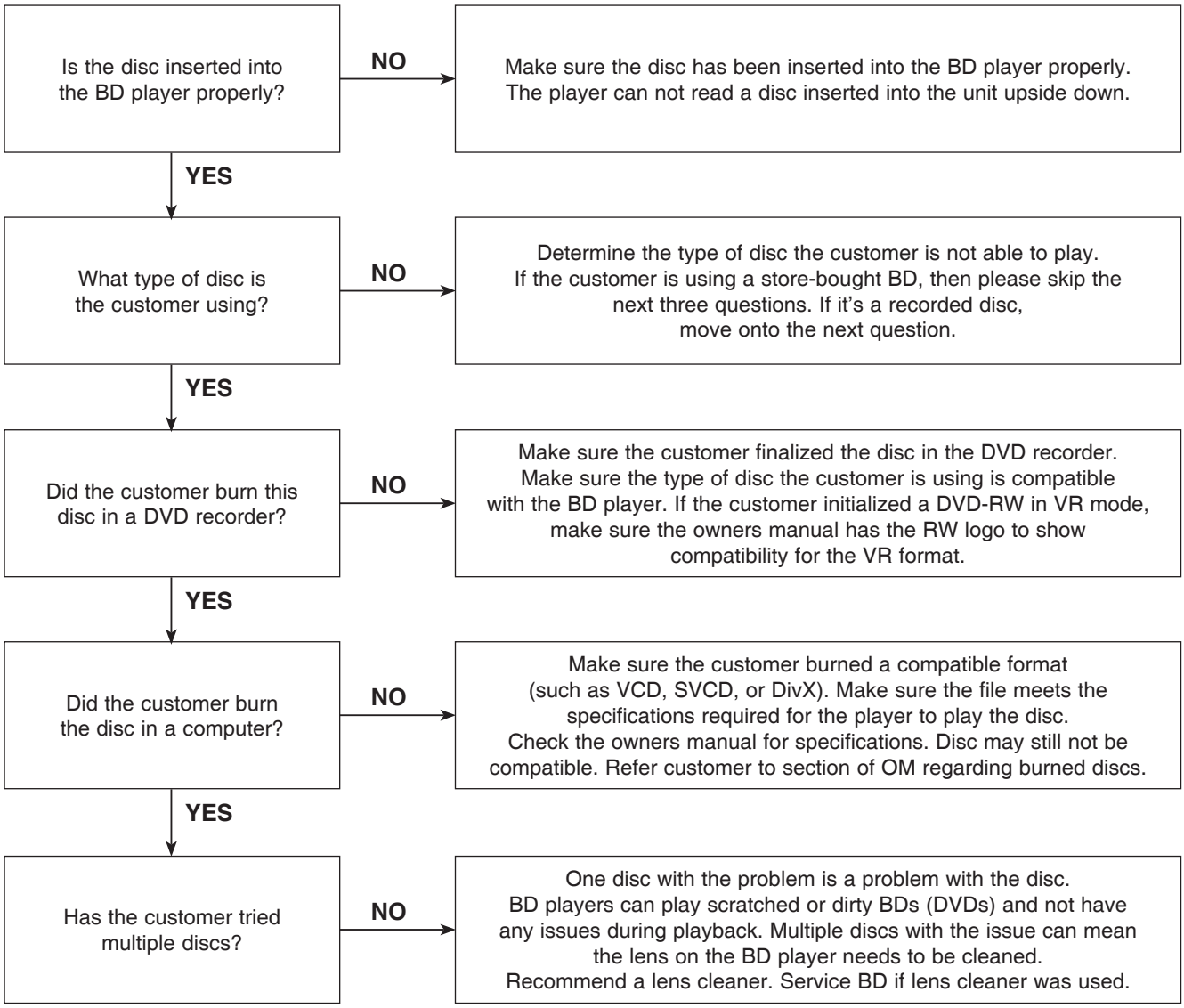
TRAINING MASTER FOR BLU-RAY (BD)

5-6. Will Not Play Disc

The unit will not play a disc when a disc is inserted into the player.



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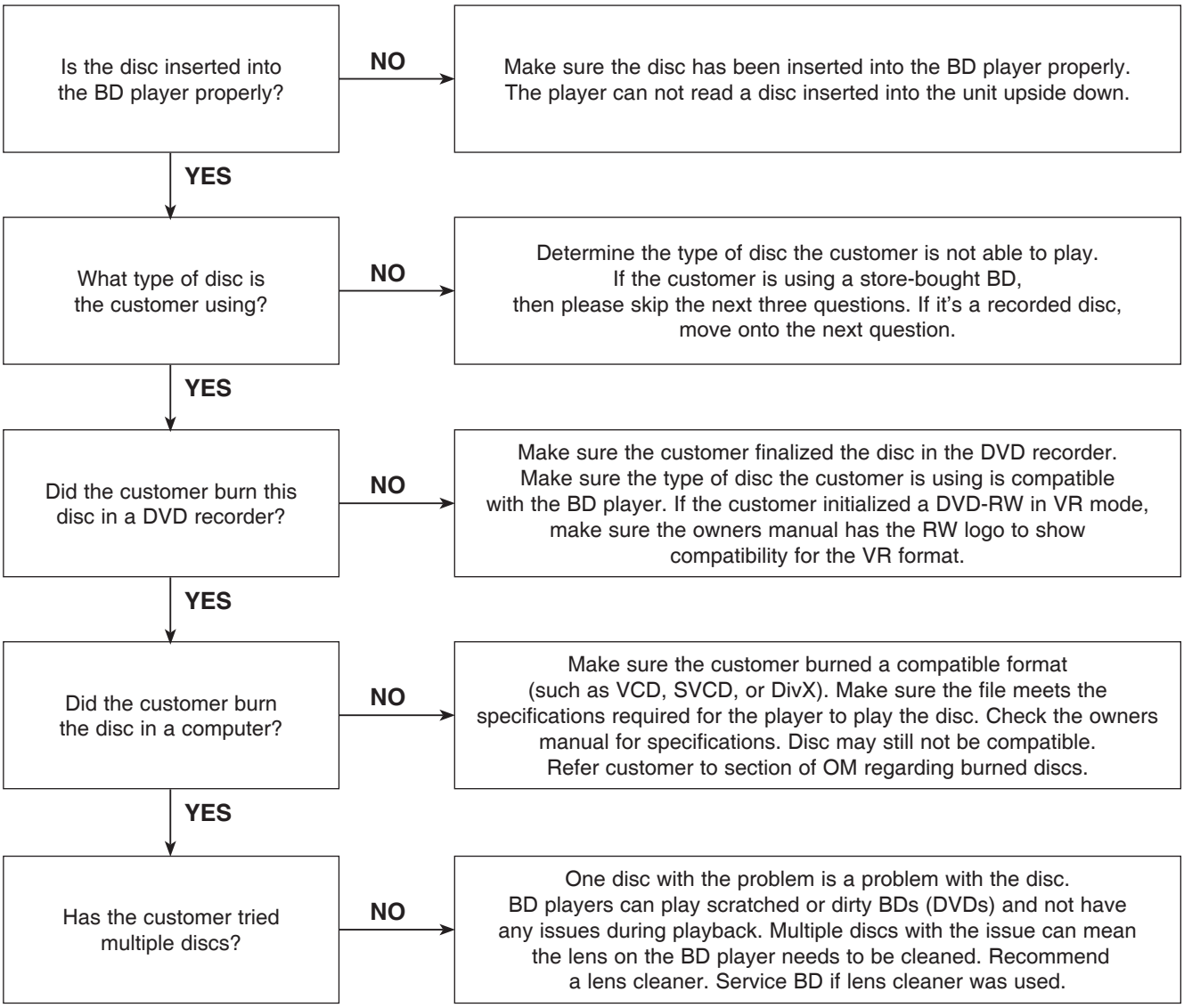
5-7. Disc Freezes or Skips

The audio and video freeze and skip during play back of a BD or DVD disc.



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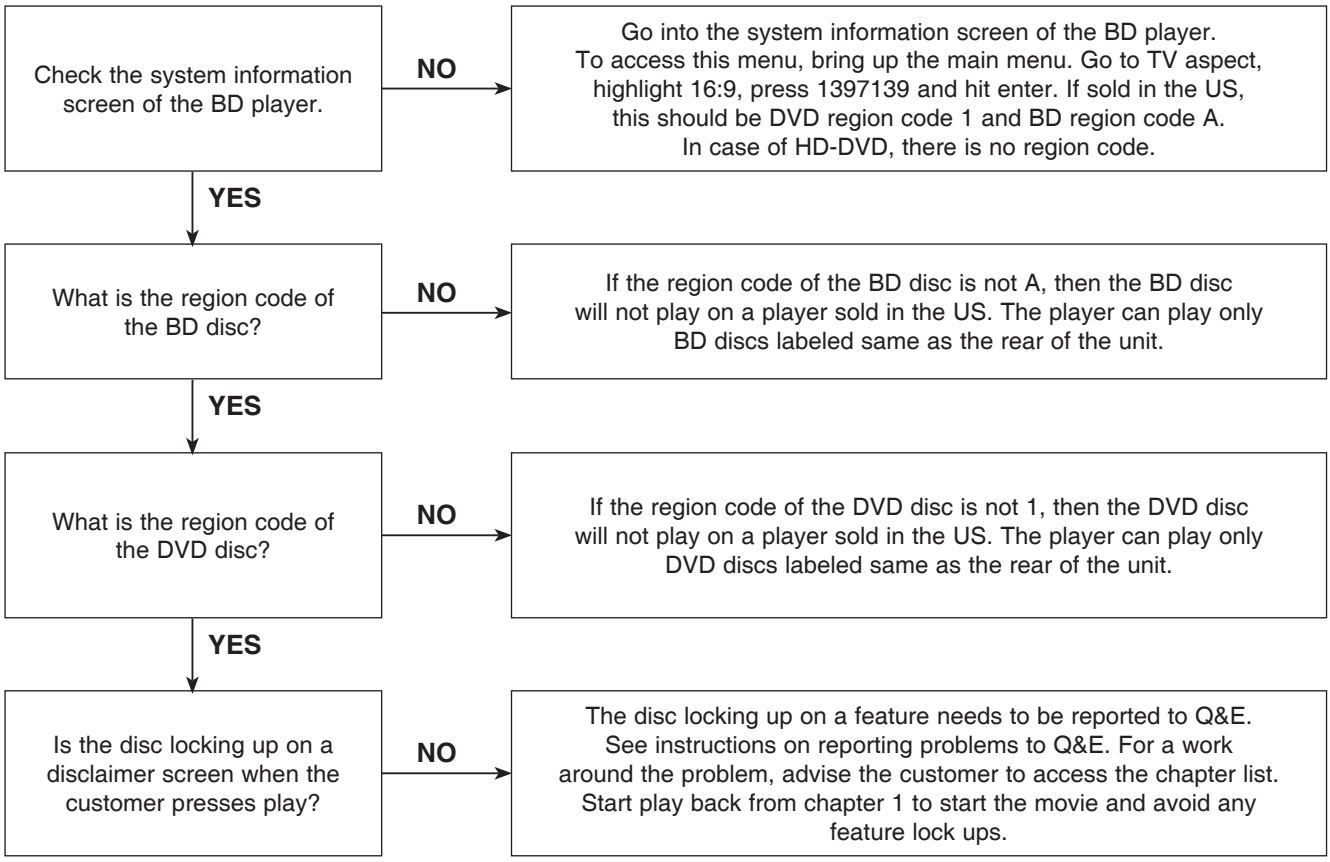
TRAINING MASTER FOR BLU-RAY (BD)

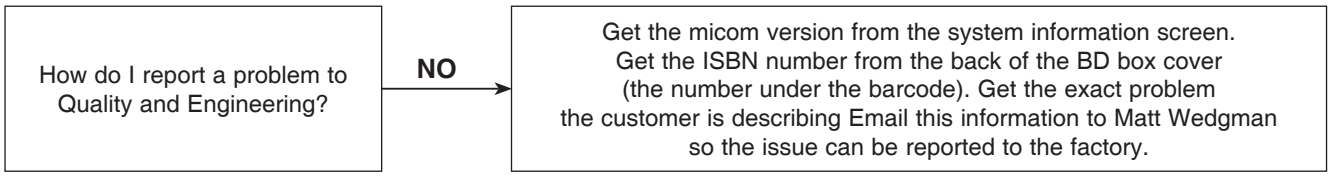
5-8. Can Access Menu, but Not Play a Movie

The disc menu is displayed but the disc will not play.



5-9. Reporting a problem to Quality & Engineering

Reporting a problem that may require a firmware update to fix.



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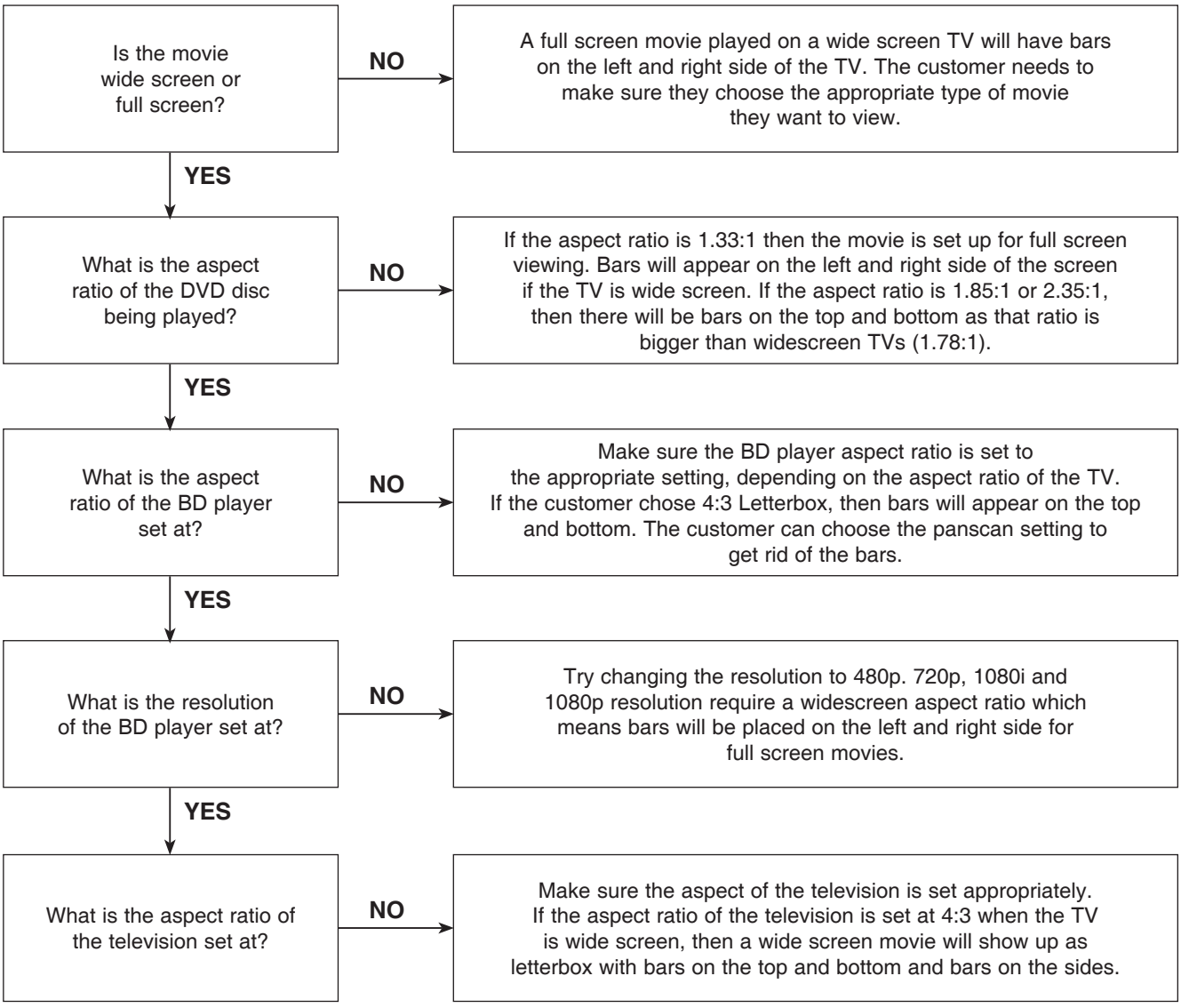
5-10. Aspect Ratio

The customer has bars on the top and bottom of the screen, the left and right of the screen, or both.



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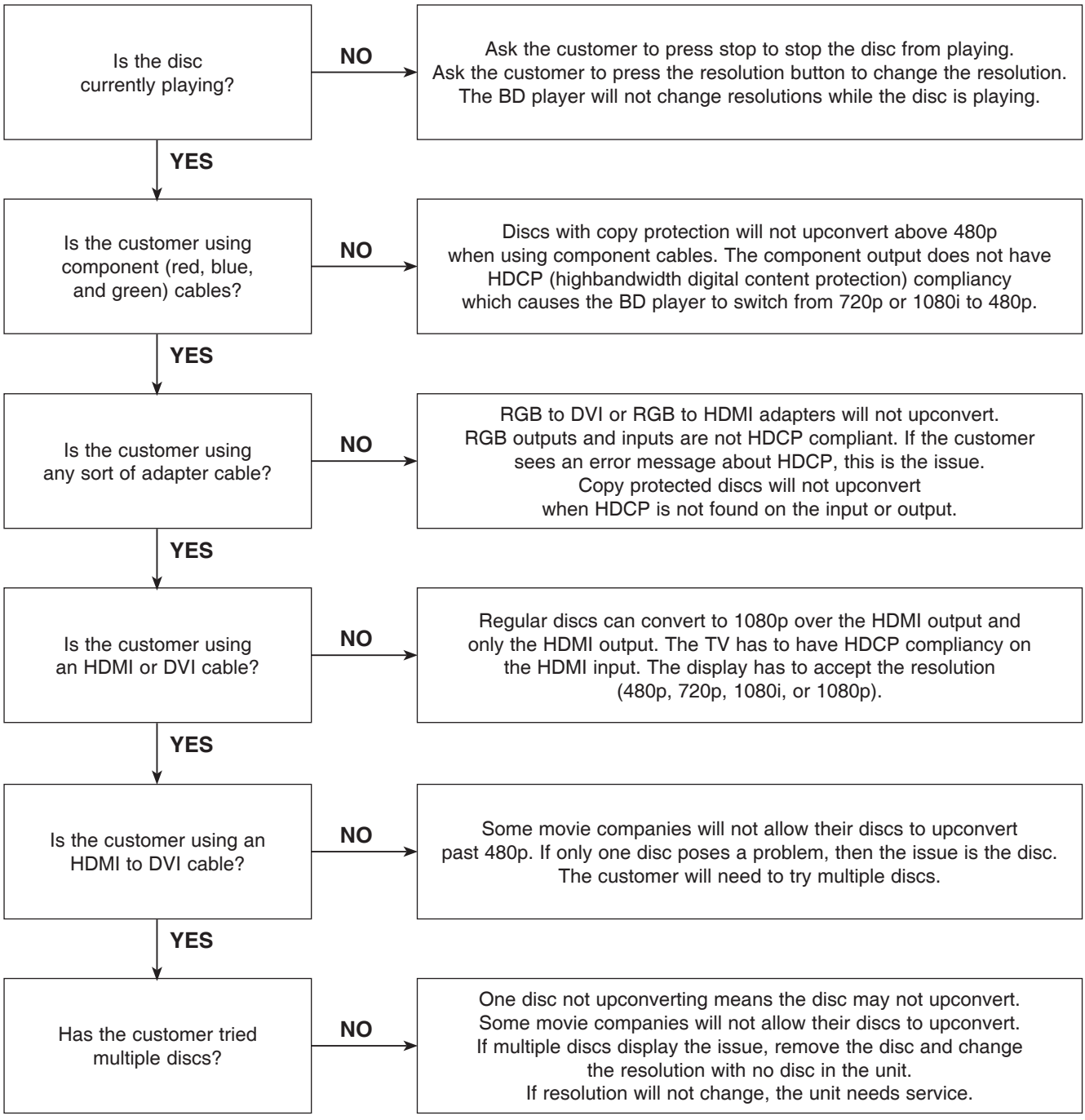
5-11. My Unit Won't Upconvert

The customer has a problem with getting the unit to change resolutions to 480p, 720p, 1080i, or 1080p.



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TRAINING MASTER FOR BLU-RAY (BD)

6. BLU-RAY PLAYER (BD390)

6-1. Slow Loading Times for BDs

Why does it take so long to load my BDs?	NO →	The loading times for a blu-ray disc is 30 seconds. When a customer switches from one disc to another, the lens will change which is what causes the delay. Blu Ray require different lasers to read the discs.

6-2. Booting Times

Why does it take so long to boot my BD?	NO →	The booting times for the BD is 20 seconds. When the set is booted, it takes a little long time to loading the OS program.

6-3. Netflix Service

Check network cable or Wifi?	NO →	Make sure the customer doesn't connect the LAN cable or Wireless module (Wi-Fi). If they don't ,The monitor is displaying "Check network cable" expression.
How do I operate the Netflix?	NO →	First, you have to check the configuration of the Network. Second, you must activate the Netflix. It is necessary to refer to Owner's Manual page 47~49. This Service is not for free.

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6-4. Ethernet Port

The purpose of the ethernet port on the BD390.

What is the purpose of the ethernet port on the BD390?	NO →	This is used for the unit to access a network dealing with interactive BD movie menu. BD390 can support BD2.0 so that network function is active in the BD disc. Also, BD390 can support VOD service such as Netflix. (USA only)
Why is not the item downloaded through the network?	NO →	Make sure the customer insert the LAN cable into the Ethernet jack. Make sure the network is active. If it is active, the disc may have a problem. If not active, see the network section of OM.

6-5. Firmware Update Availability

Is there a firmware update available for the BD390?	NO →	Yes, firmware updates are available at http://us.lgservice.com that address some playback issues with movies. Go to device drivers and click on DVD&VIDEO&SET-TOP. The BD390 firmware updates are available there. Advise the customer to download the firmware and unzip the file. Also, firmware updates are done by network. Select Home Menu -> Setup -> Others -> Software update menu.

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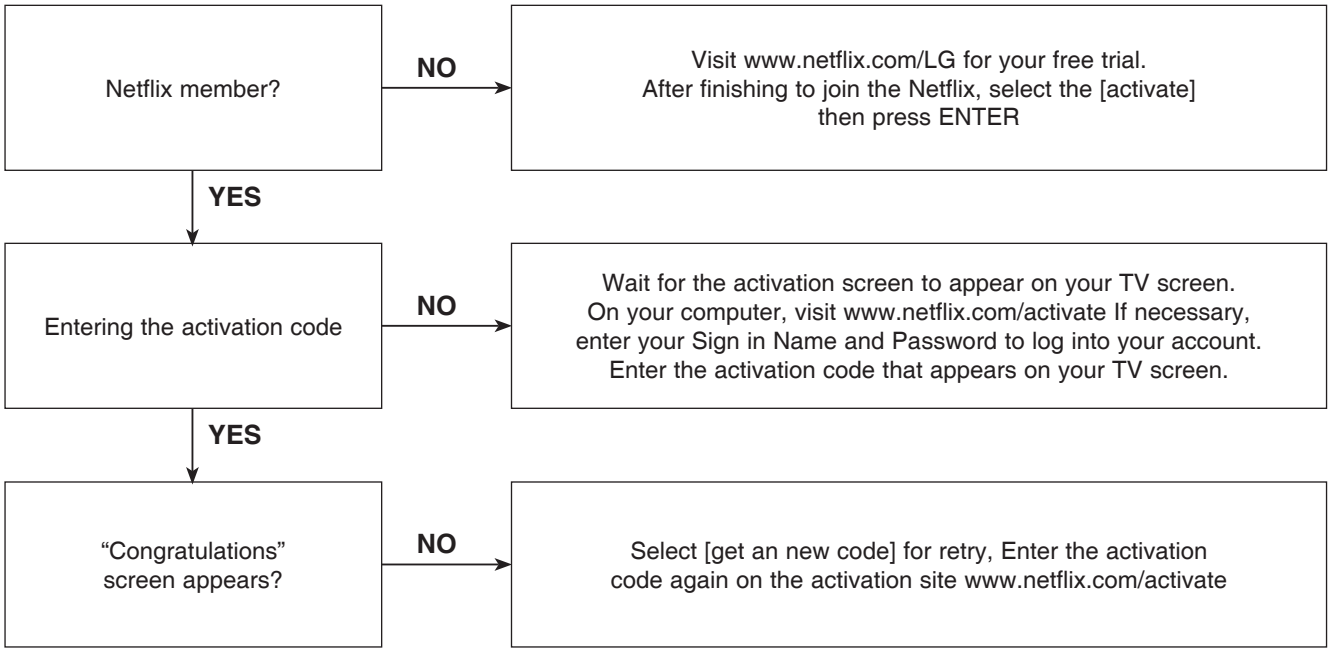
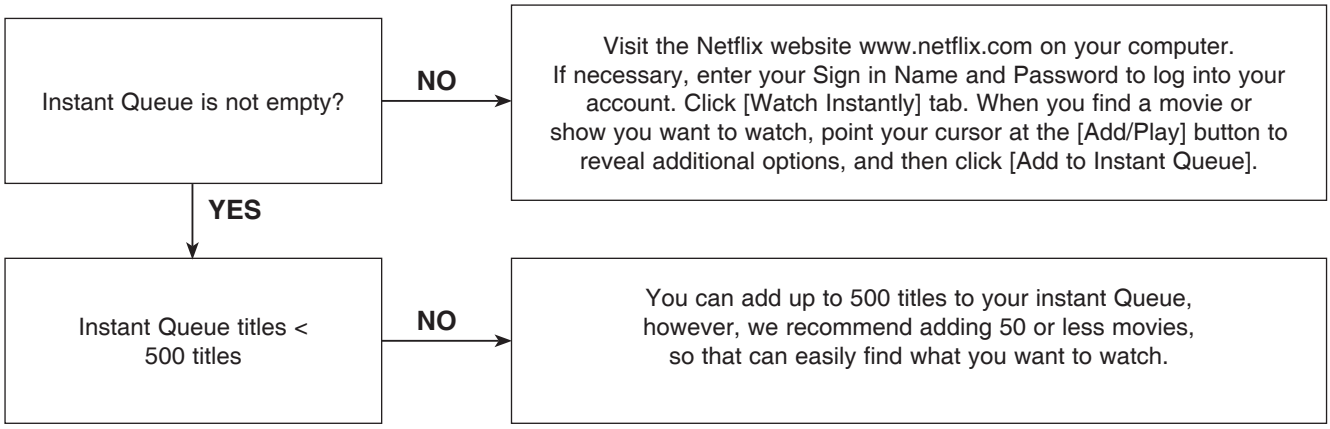
7. NETFLIX

7-1. Activation

Activating the unit establishes a connection between the unit and Netflix account



7-2. Adding Movie to your player



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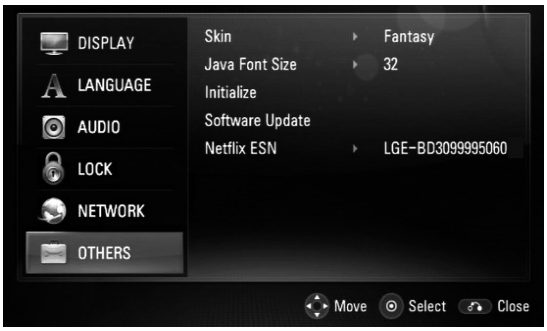
7-3. ESN (Electronic Serial Number) Validation

(Select [OTHERS] on the [Setup] menu.
And then Select [Netflix] on the [OTHERS] menu.
And then Check [Netflix ESN].)



Does it begin with "LGE-BD39" followed by "8-digit"?

NO → If not, the set has a bad ESN -> BD390 exchange (It should not happen)

Select [Streaming] on the [Home] menu.

Is it activated successfully?

NO → This means that ESN is valid.

YES

Is Netflix server ok?

NO → If Netflix Server is dead, activation fails even if the ESN is valid.

YES

Netflix server is ok, but fails in activation.

NO → Call Netflix Customer Support and check that this ESN added to the Netflix DB

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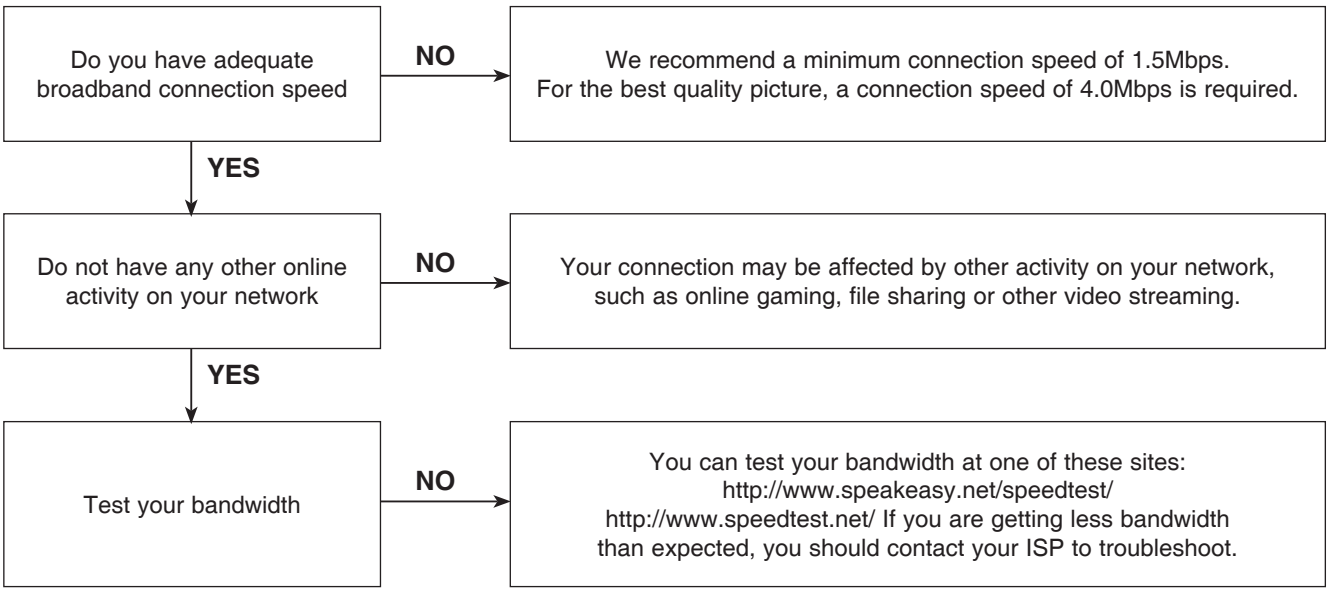
7-4. Less Bandwidth and less resolution movie than expected

The Quality indicator during movie retrieval corresponds to the following bandwidth requirements:

SD stream bitrate in Kbps		Bars
min	max	to display
0	100	1
101	200	2
201	300	3
301	400	4
401	450	5
451	700	6
701	950	7
951	1200	8
1201	1450	9
1451	1700	10
1701	99999	11
NA	NA	12
when HD only	when HD only	13



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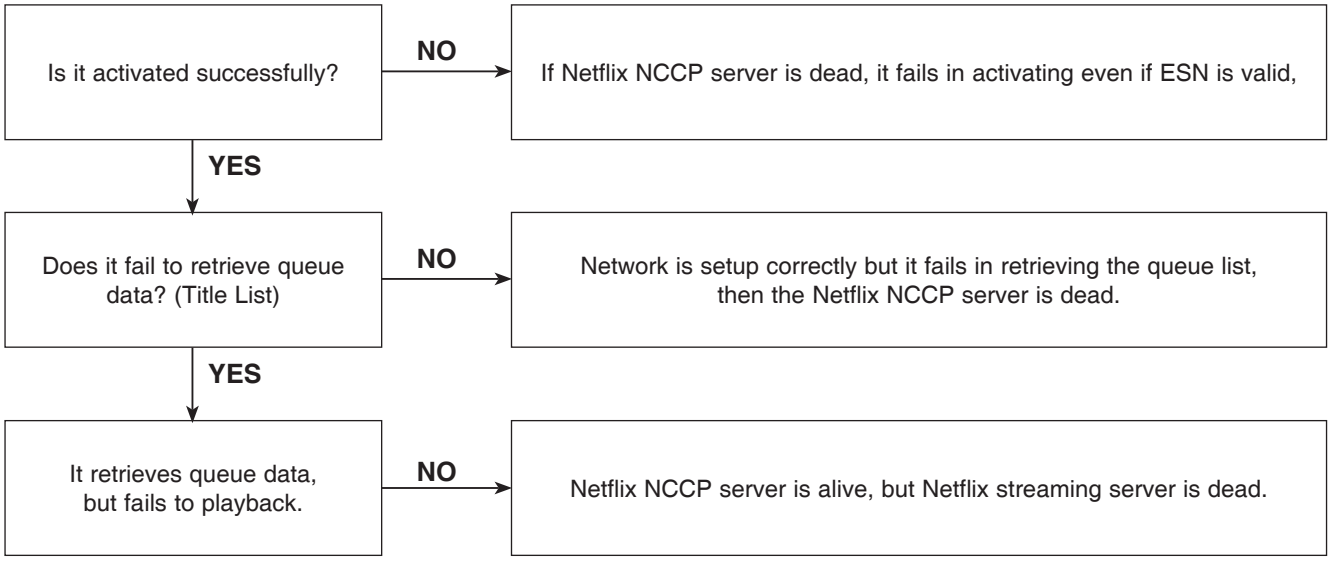
7-5. Errors from Netflix server

Following operations could be abnormal if Netflix server is dead

- Activation
- Queue retrieving
- Movie playback



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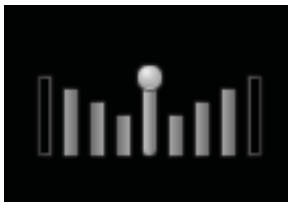
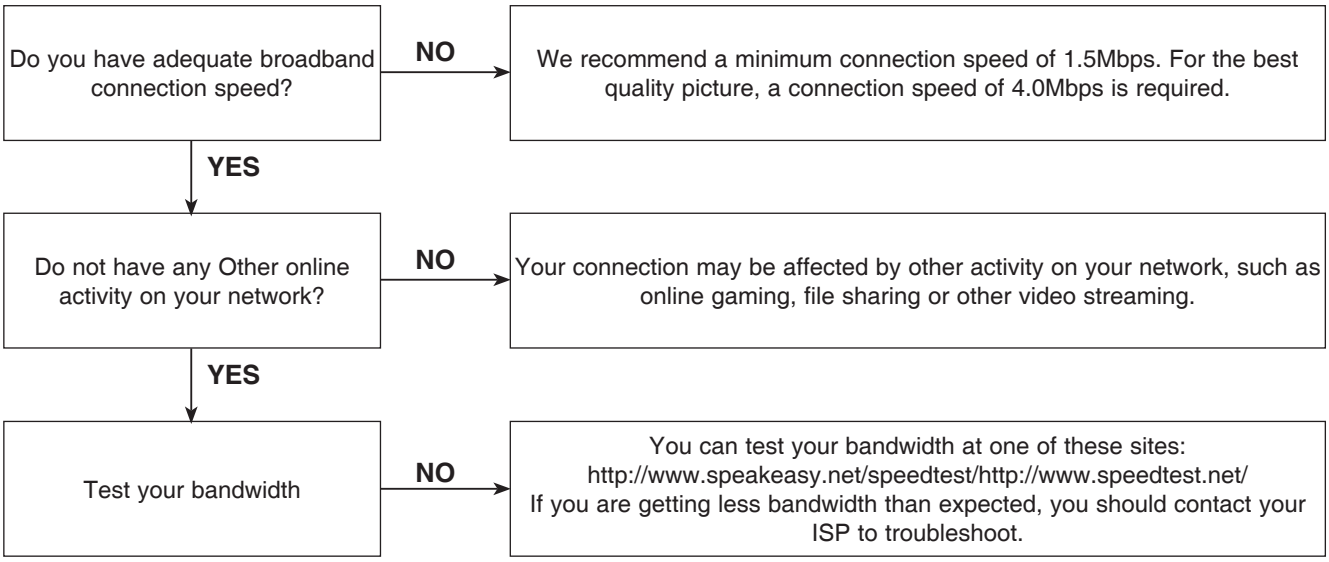
8. YouTube

8-1.Frequent buffering happens while playing videos.

Network Condition Meter indicate current network speed between BD Player and YouTube stream server.
To play videos without buffering, Network Condition Meter should have more than 3 Bars.



Bitrate in Kbps		Bars
min	max	to display
0	200	0
200	400	1
400	600	2
600	800	3
800	~	4



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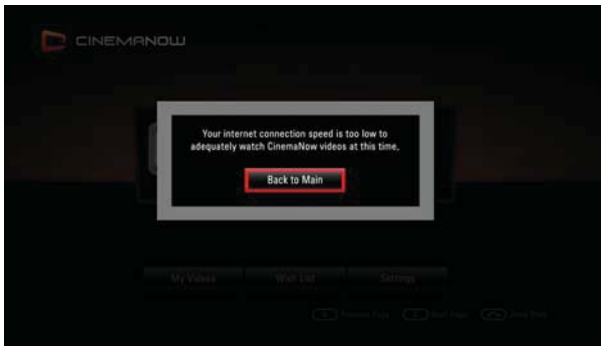
9. CINEMANOW

9-1. Entering the Cienmanow Function.
(Before using the Cinemanow function, it guides a user network status)

Does It connect to internet?	NO →	To enter cinemanow mode, it try to check internet connection. If failed, it displays the popup message to the user. User can move to [Home] menu or [Network setting] menu as our guideline.
Check the network speed?	NO →	If success, it check the network speed from cinemanow server. We recommend a minimum connection speed of 700kbps for playing titles. If the result of speed check is lower than 700kbps, it displays the warning message to user.



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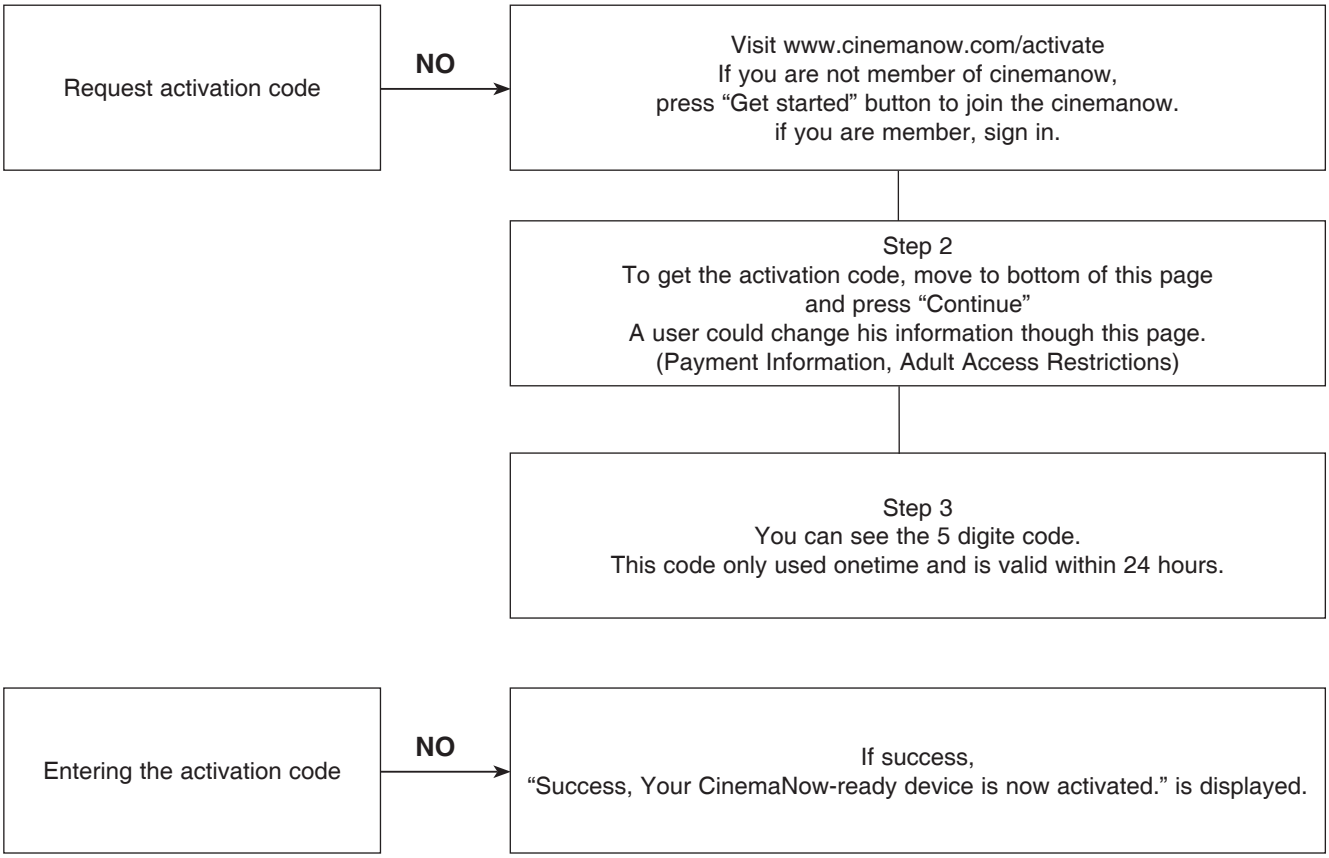
9-2. Activation
(To rent or buy titles, a user must activate the player, Activating the unit establishes a connection between the unit and Cinemanow account)



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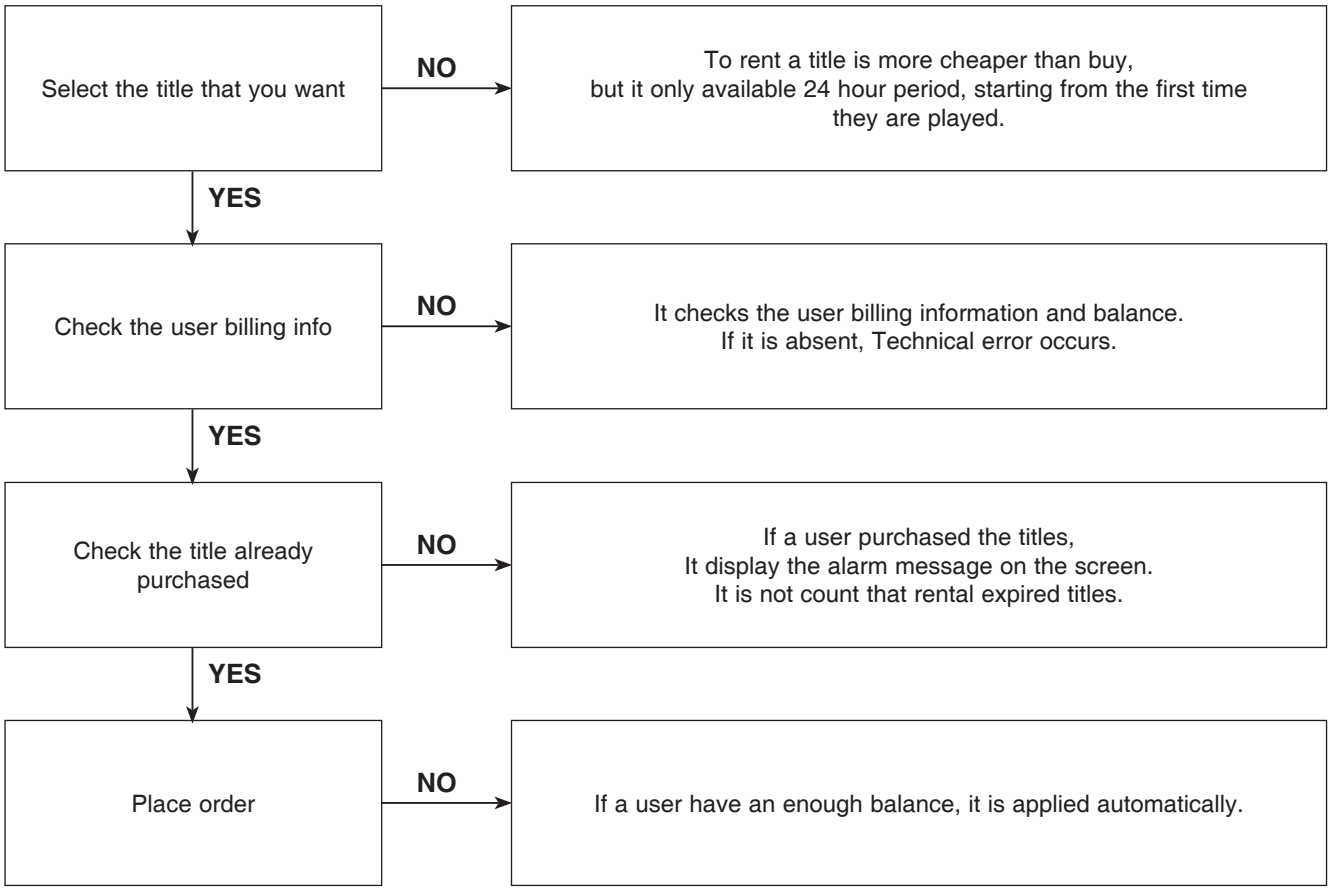
9-3. Purchase titles

(To watch the stream video, you should browse and buy titles at the player.)



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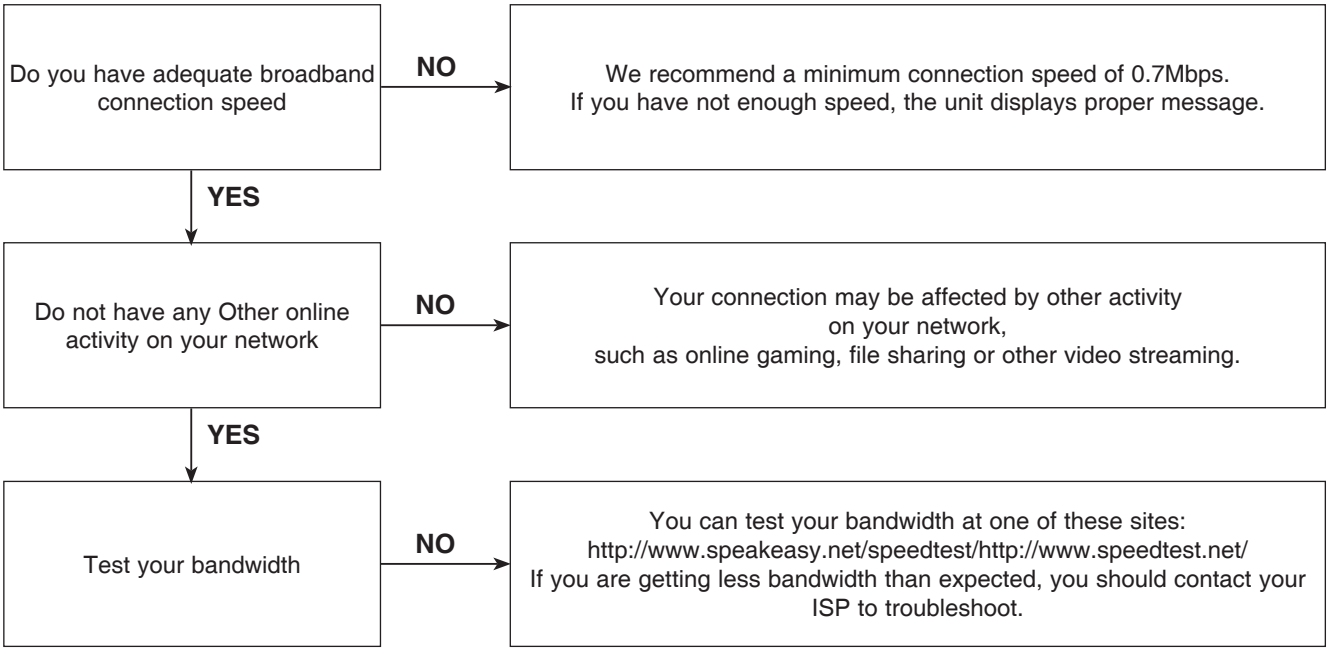
9-4. Less Bandwidth and less resolution movie than expected

The Quality indicator during movie retrieval corresponds to the following bandwidth requirements:

- 1 box is 0.7 Mbps
- 2 boxs is 1.0 Mbps
- 3 boxs is 1.5 Mbps
- 4 boxs is 2.0 Mbps



9-5. Play title restriction.

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9-6. Techincal Error.

Our unit displays error code and message that are given by cienmanow server. A user can be supported by cinemanow with this error code and message.	"We're Sorry. We have encountered a Technical error. Please retry. If the problem presists, please contact CinemaNow Customer support at www.cinemanow.com/support (code [message])

9-7. No Internet Access.

Before staring cinemanow service, it is checked whether internet is connected or not, but during the network communication, it is detected that internet connection is closed. A user make it sure that internet connection is working.	"We are not able to connect to the internet. Please make sure your network cable is plugged in, Your internet connecting is working properly, and that your device is setup properly.

9-8. Connectivity Error

The unit meet an account some error but it is not classified, It displays following error message. A user can retry his operation, after checking their internet connection.	We have detected a problem with your connection. Please make sure your internet connection is working propely.

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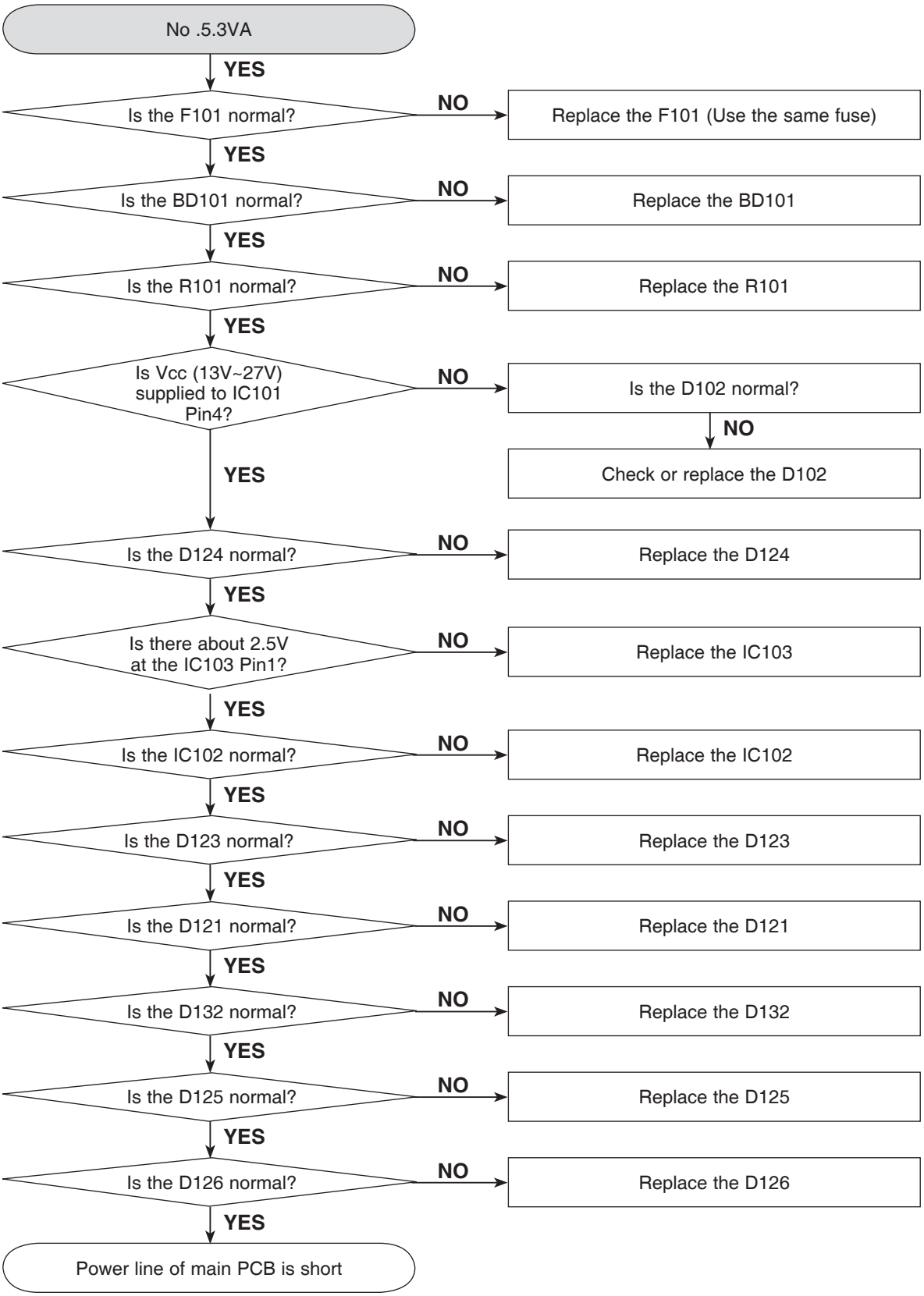
1. POWER SUPPLY (SMPS)



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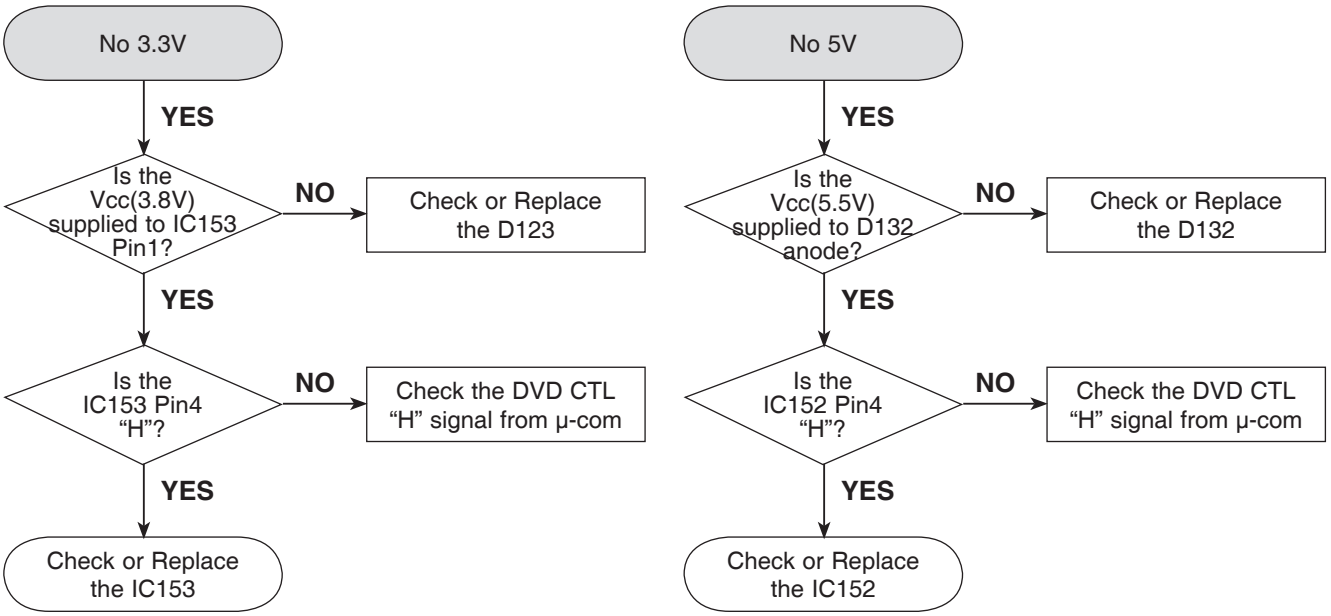
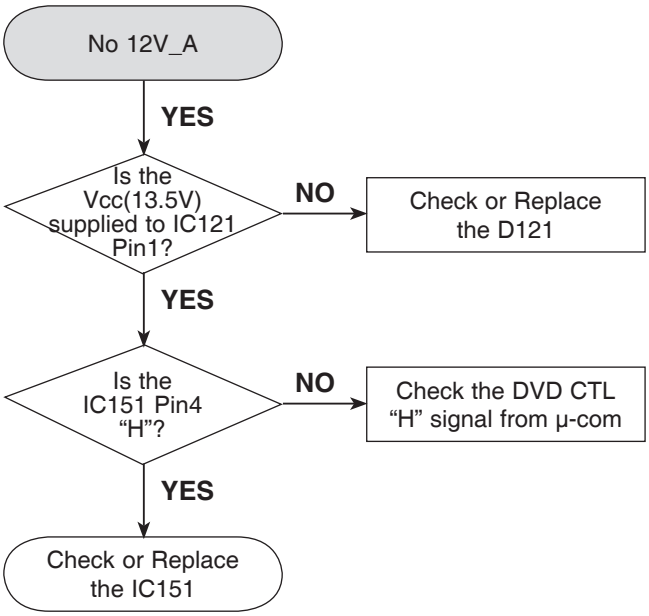
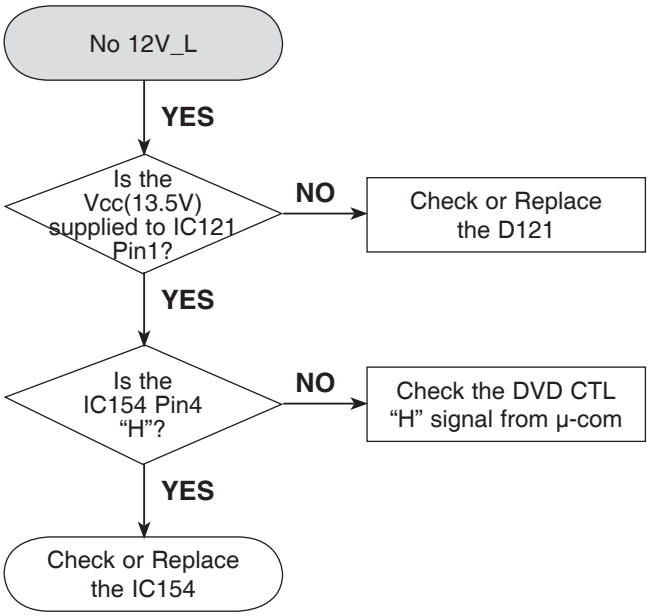
ELECTRICAL TROUBLESHOOTING GUIDE







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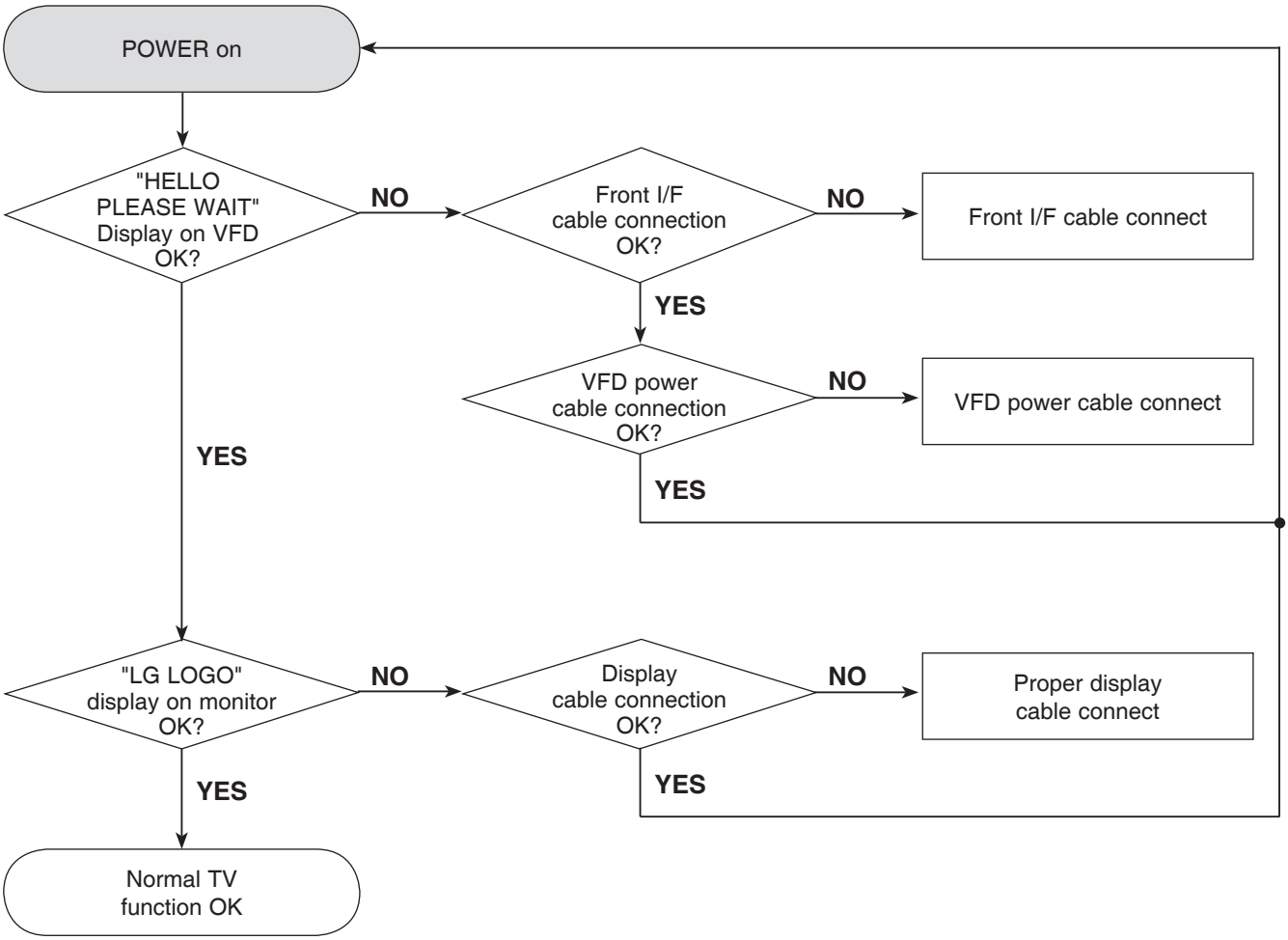
ELECTRICAL TROUBLESHOOTING GUIDE

2. POWER ON



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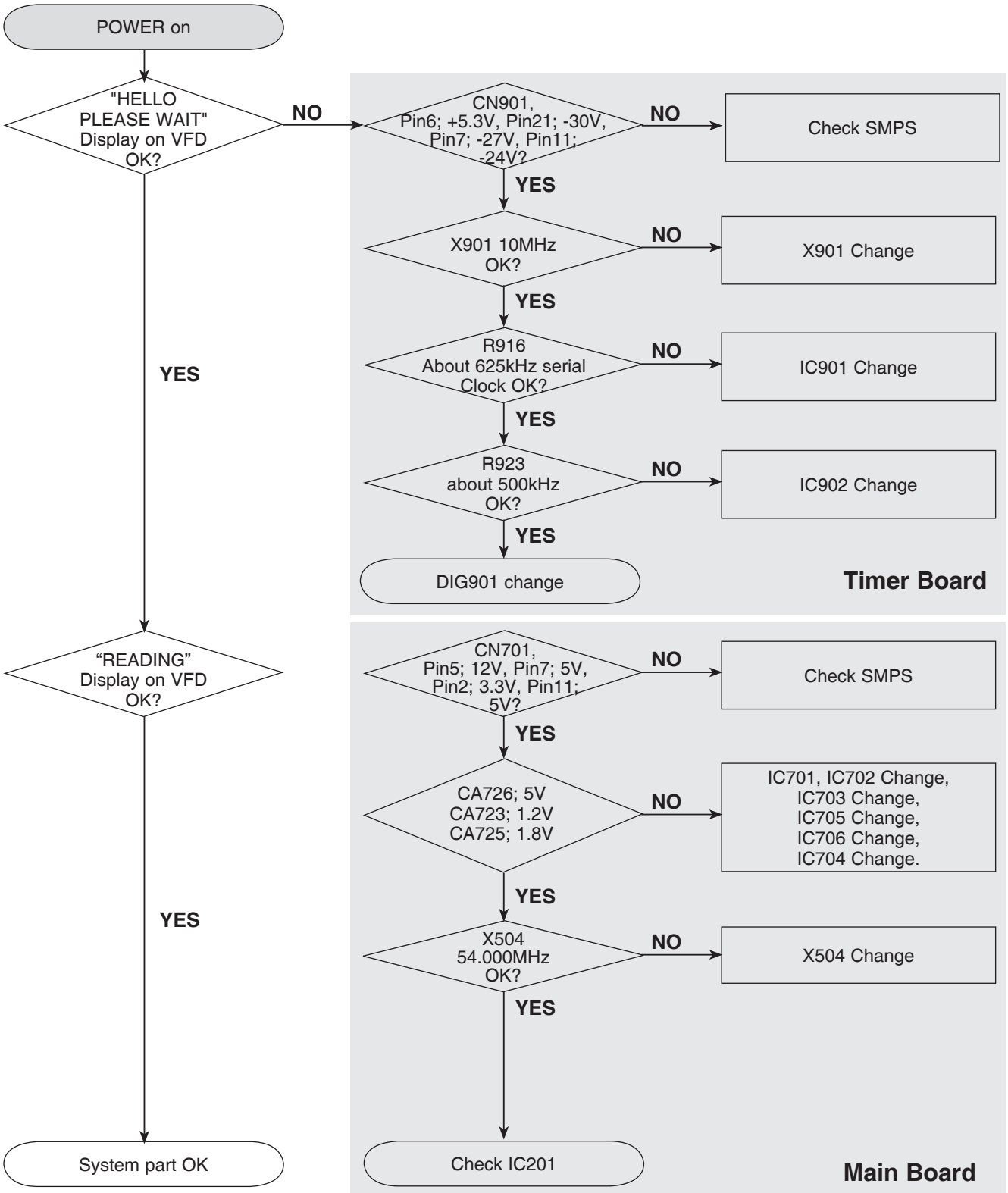
3. SYSTEM PART



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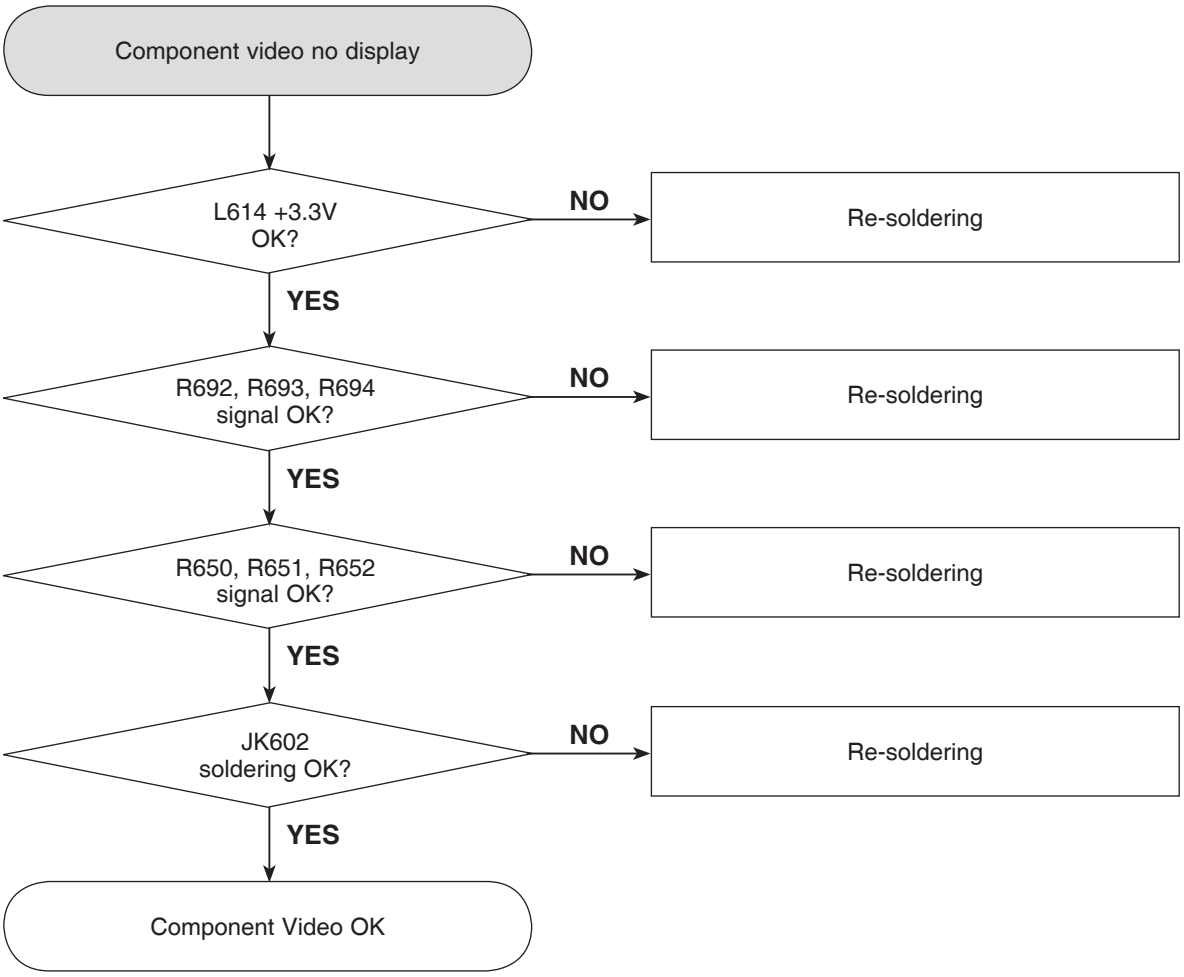
ELECTRICAL TROUBLESHOOTING GUIDE

4. COMPONENT (YPbPr) VIDEO OUT



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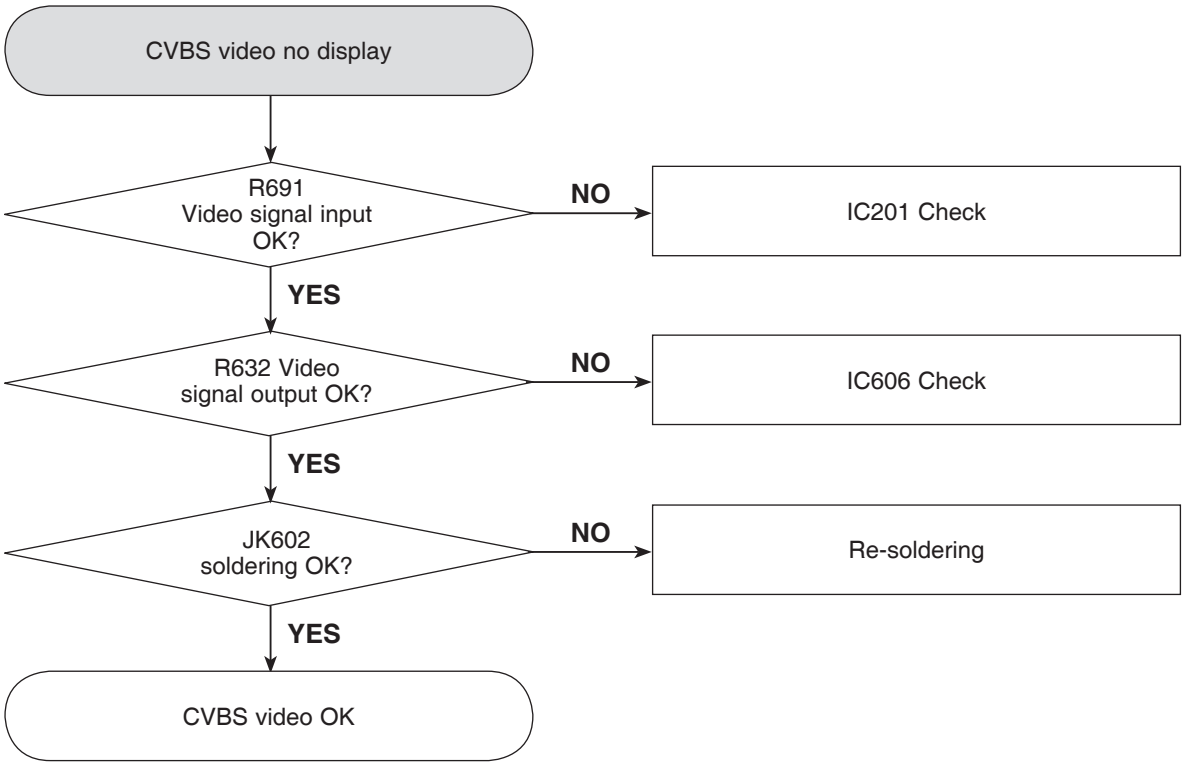
ELECTRICAL TROUBLESHOOTING GUIDE

5. CVBS VIDEO OUT



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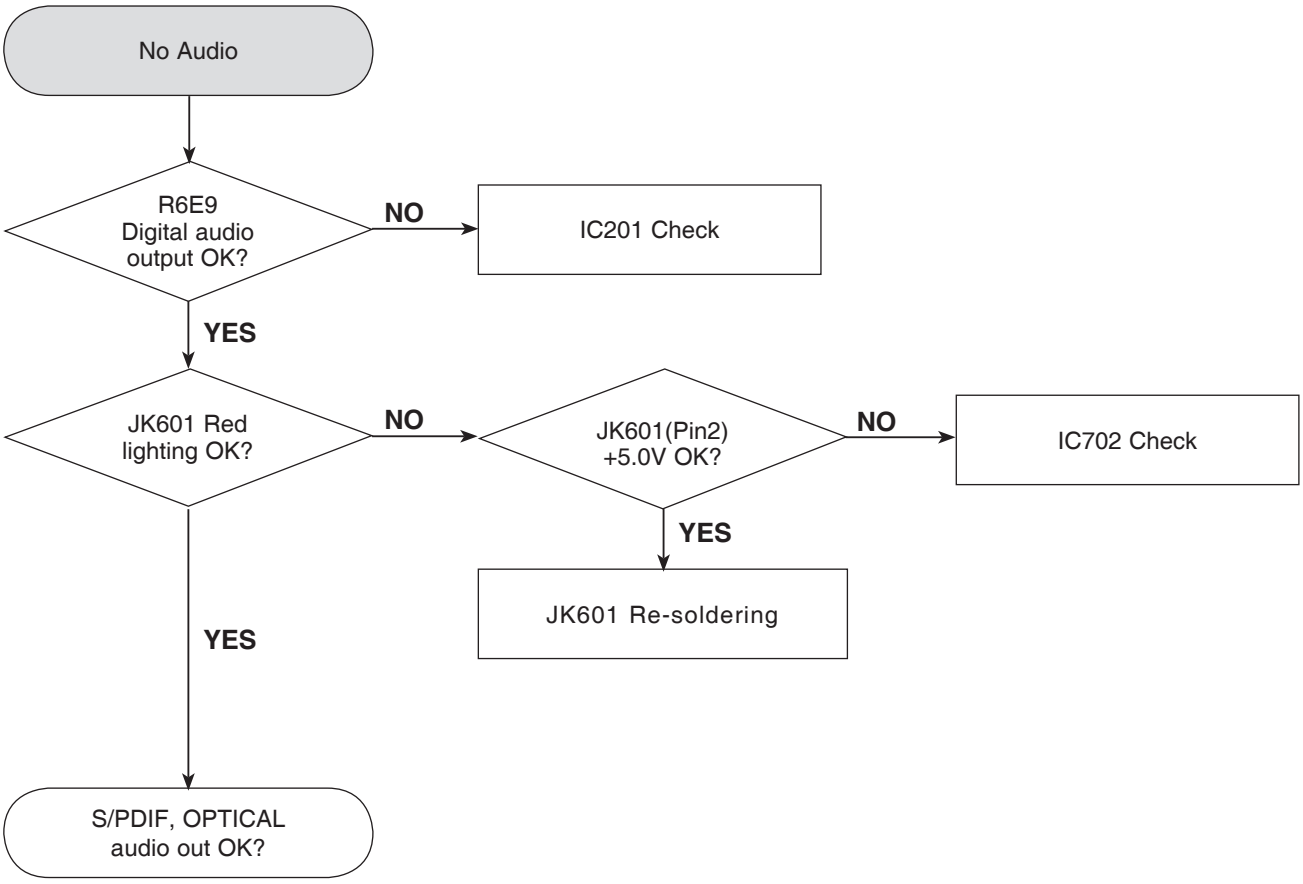
6. AUDIO (S/PDIF, OPTICAL)



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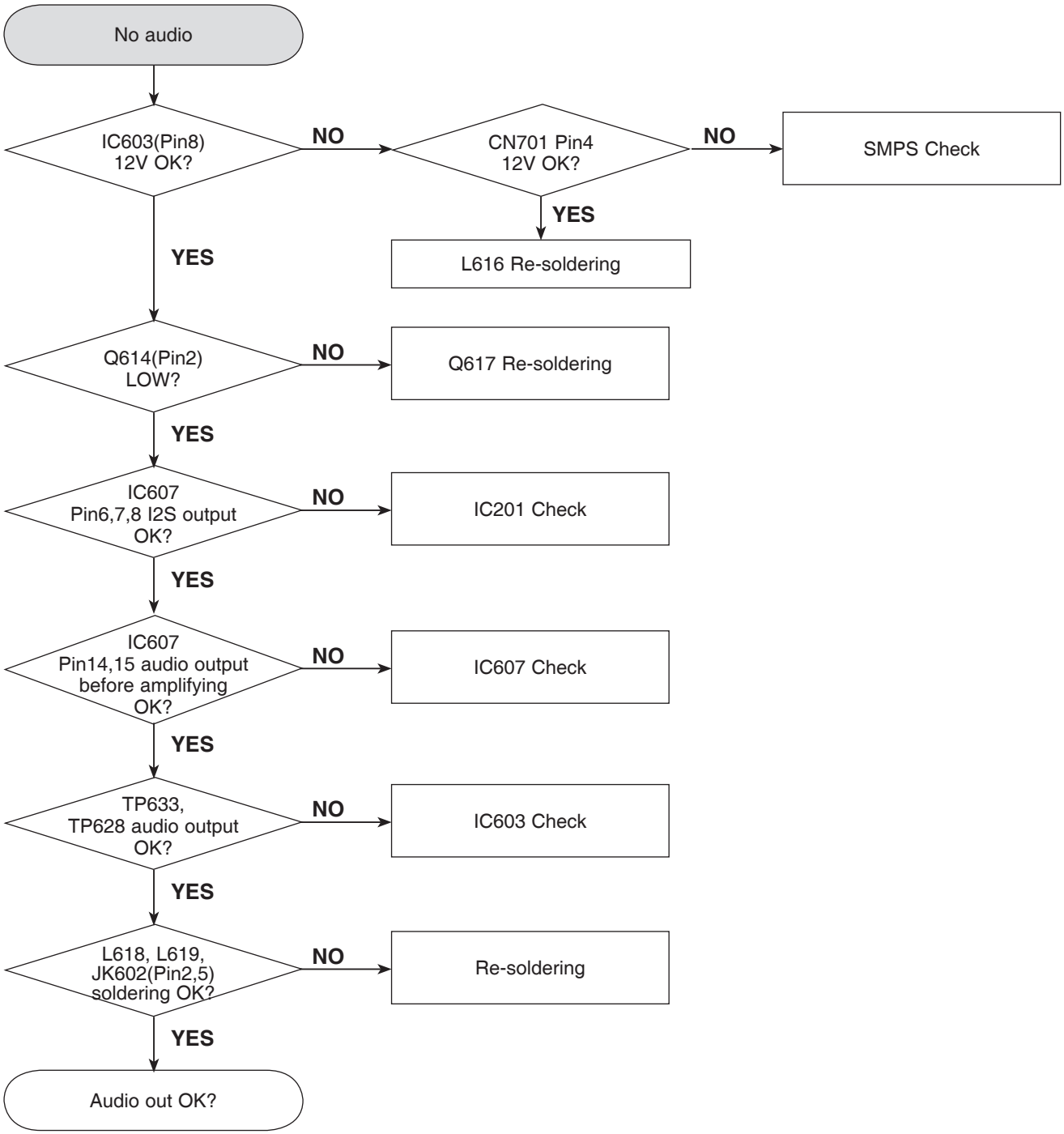
7. AUDIO (ANALOG)



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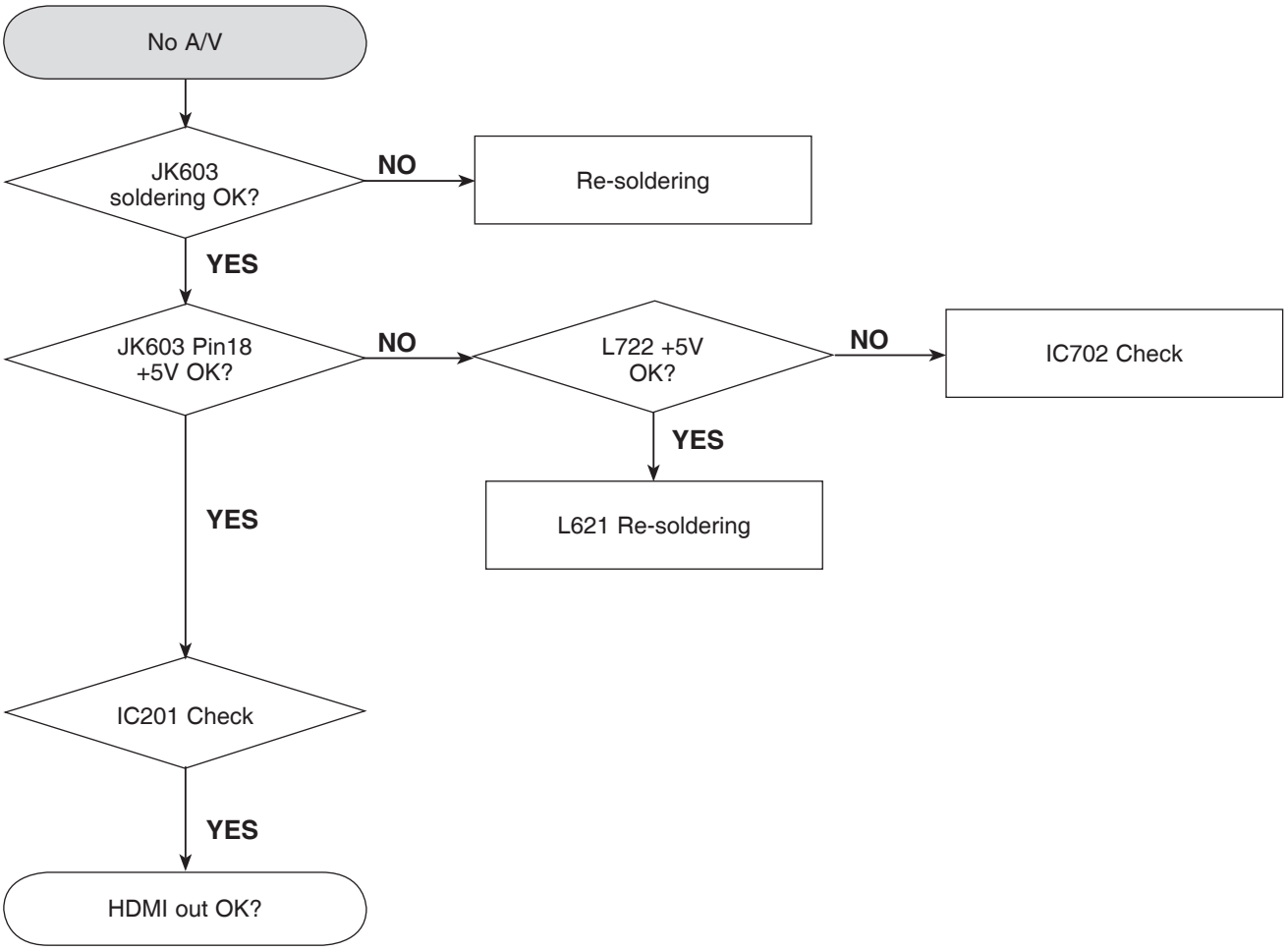
8. HDMI



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COMPONENT REPAIR GUIDE

1. NO POWER PROBLEM (BD300 / BD390)

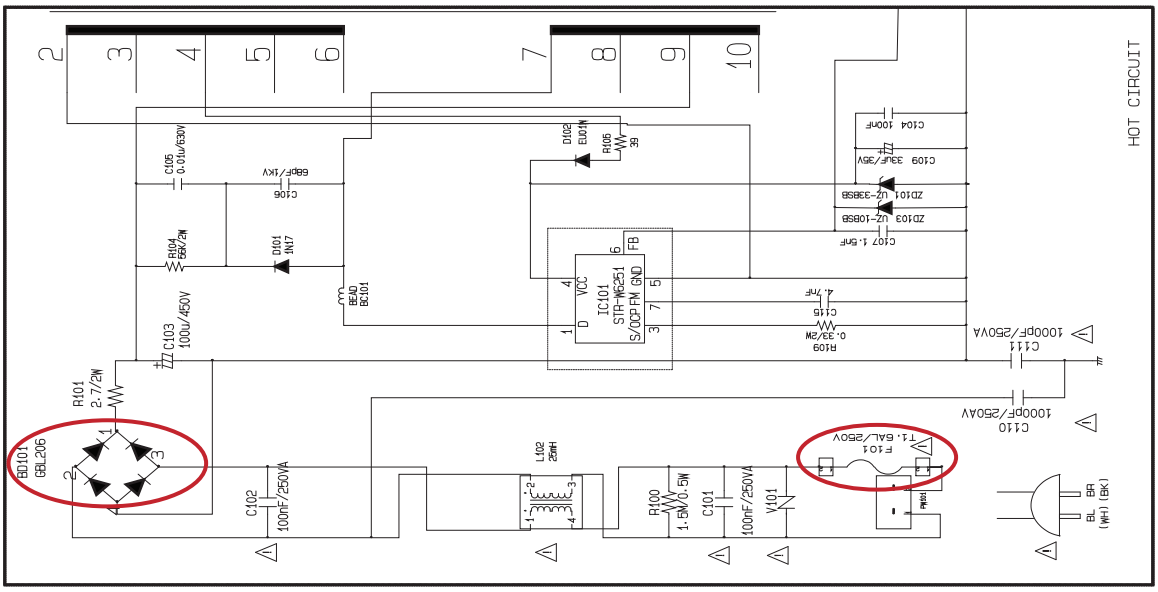
No power problem occurs when you power on the unit.

1-1. Solution

Replace F101, BD101 on SMPS board.

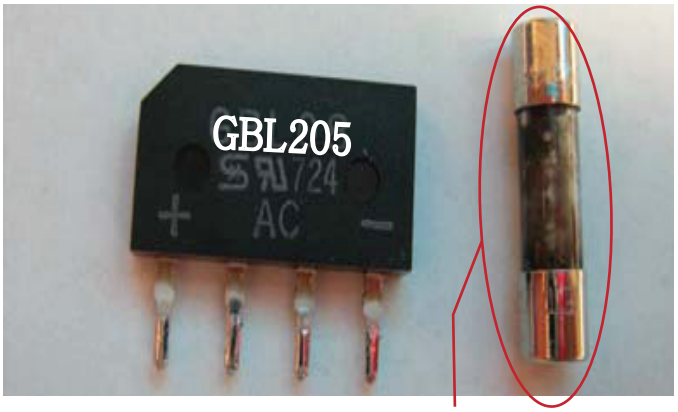
1-2. How to troubleshoot (Countermeasure)

1) Look at the physical of fuse F101.
2) Check the bridge diode BD101



1-3. Service hint (Any picture / Remark)

Check with ohm meter is short



Can look at the physical condition

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COMPONENT REPAIR GUIDE

2. VFD DOESN'T DISPLAY (BD300 / BD390)

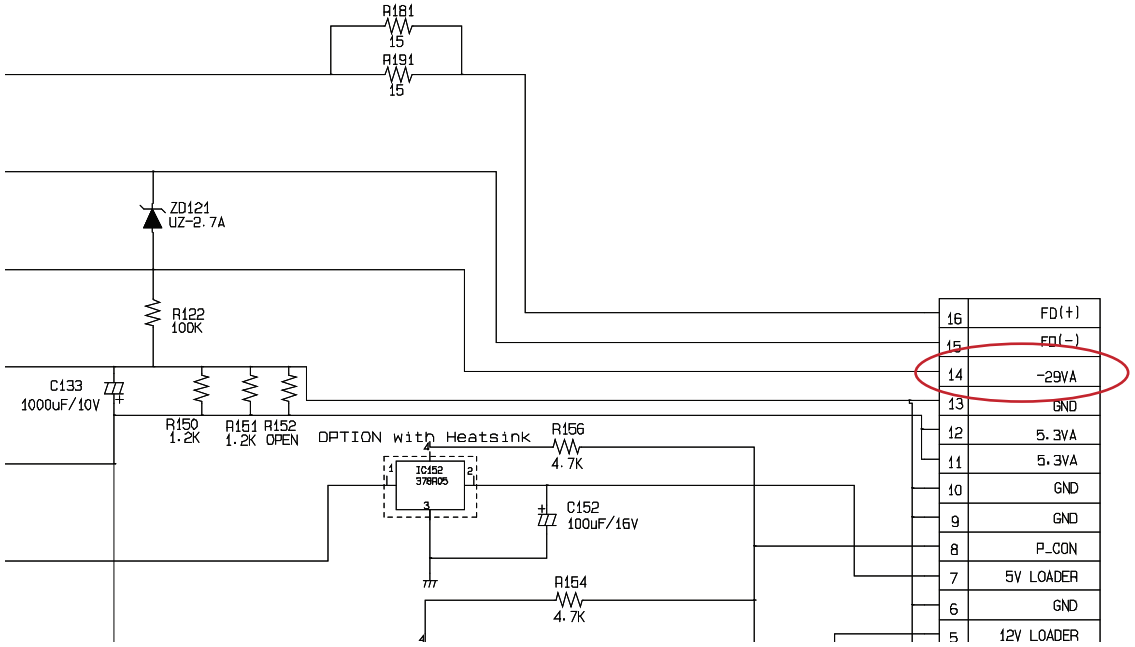
Timer board doesn't work. (abnormal display)

2-1. Solution

Replace ZD121 on SMPS board.

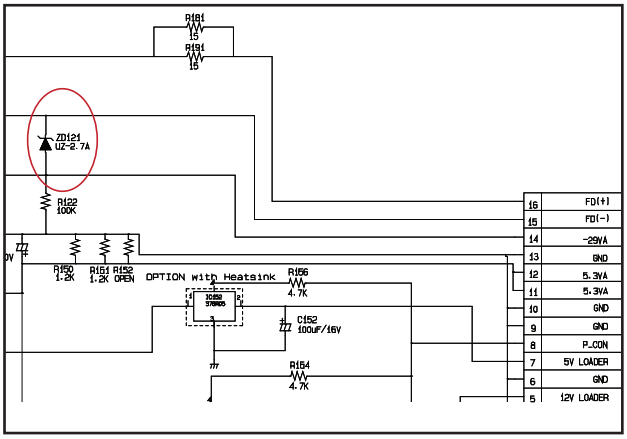
2-2. How to troubleshoot (Countermeasure)

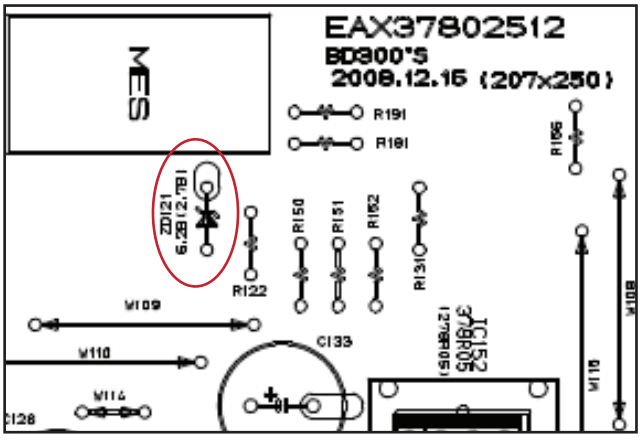
1) Check PN101 in pin14 --> -29VA at power



VFD voltage

2-3. Service hint (Any picture / Remark)





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COMPONENT REPAIR GUIDE

3. NO POWER (BD300 / BD390)

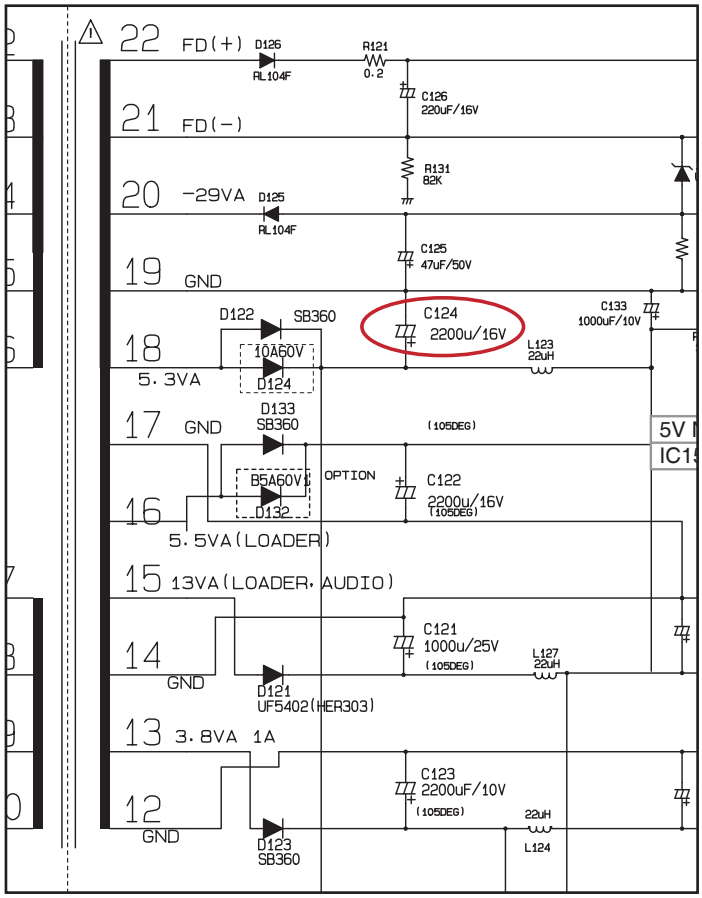
No power problem occurs when you power on the unit.

3-1. Solution

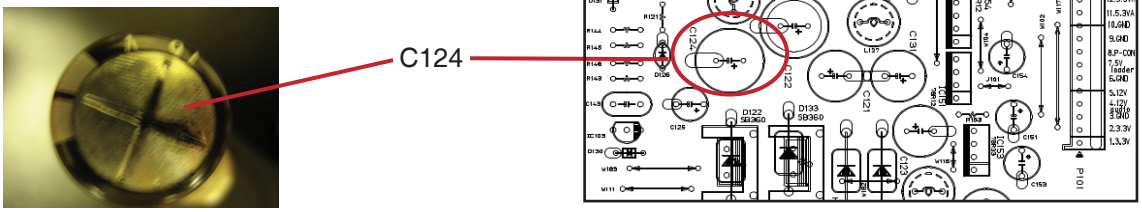
Replace C124 on SMPS board.

3-2. How to troubleshoot (Countermeasure)

1) Check all of voltage.



3-3. Service hint (Any picture / Remark)



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COMPONENT REPAIR GUIDE

4. THE DISC TRAY DOESN'T WORK. (BD300 / BD390)

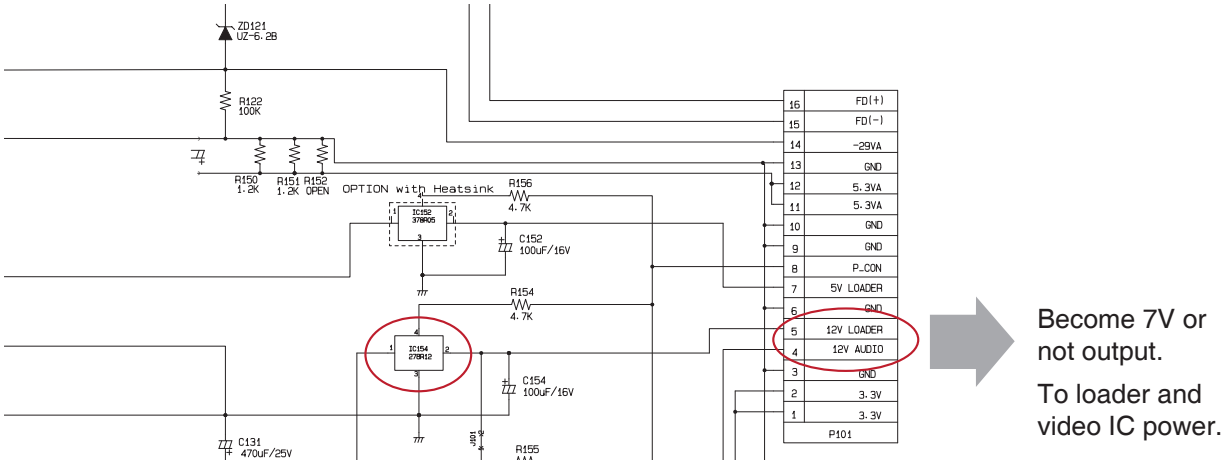
When you turn on your BD300, it will doesn't work Disc tray

4-1. Solution

Replace IC154 on SMPS board.

4-2. How to troubleshoot (Countermeasure)

1) Check all Voltage in SMPS..
2) 12 Volt become 7 Volt.



4-3. Service hint (Any picture / Remark)

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COMPONENT REPAIR GUIDE

5. NO BOOTING WHEN YOU TURN THE UNIT ON. (BD390)

When you turn on your BD-P, it will display “Hello” or “Please wait” message continuously on front panel, and it will not boot-up normally.

5-1. IC706

5-1-1. Solution

Replace IC706 on main board.

5-1-2. How to troubleshoot (Countermeasure)

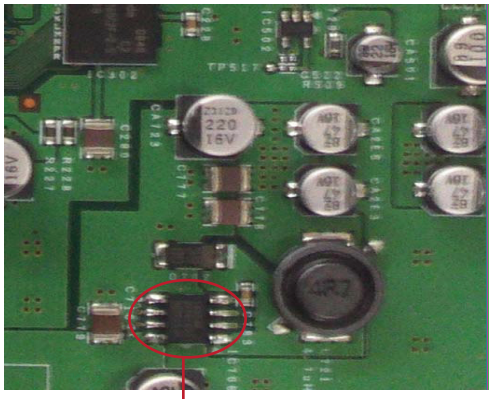
1) Please check 1.2V of CA723.

2) If 1.2V voltage doesn’t come out, check P_CON_5.3V of JIG910(front board).
--> If you figure out those power control doesn’t come out any signal level (or voltage), please replace IC901 of front board.

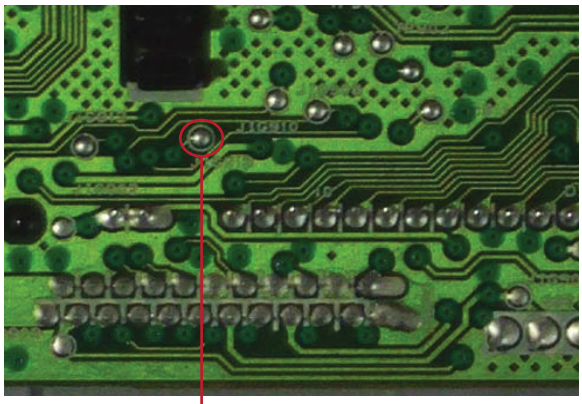
3) If P_CON_5.3V comes out 5V signal,
first, check the C704,R710, R705, R708(bottom of main) and then replace IC706.

4) After changing it, if the set is still not booting, check MPEG IC(IC201). Refer to item 5-7.

5-1-3. Service hint (Any picture / Remark)



< Main board top view >



< Front board bottom view >

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COMPONENT REPAIR GUIDE

When you turn on your BD-P, it will display “Hello” or “Please wait” message continuously on front panel, and it will not boot-up normally.

5-2. IC704

5-2-1. Solution

Replace IC704 on main board.

5-2-2. How to troubleshoot (Countermeasure)

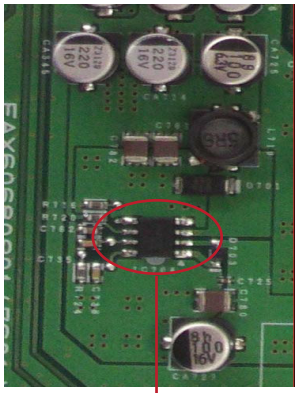
1) Please check 1.8V of CA714.

2) If 1.8V voltage doesn’t come out, check P_CON_5.3V of JIG910(front board).
--> If you figure out those power control doesn’t come out any signal level (or voltage), please replace IC901 of front board.

3) If P_CON_5.3V comes out 5V signal, replace IC704.

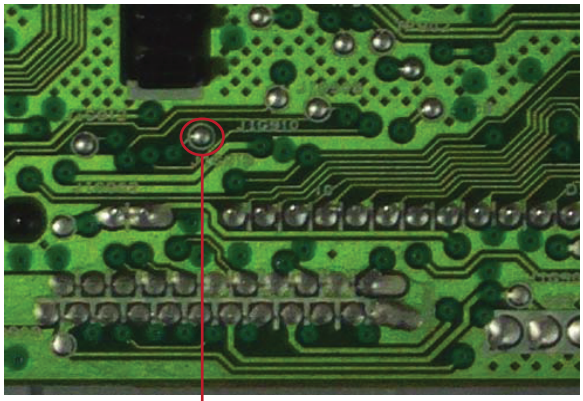
4) After changing it, if the set is still not booting, check MPEG IC(IC201). Refer to items 5-7 & 5-6.

5-2-3. Service hint (Any picture / Remark)



IC704

< Main board top view >



JIG910

< Front board bottom view >

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COMPONENT REPAIR GUIDE

When you turn on your BD-P, it will display “Hello” or “Please wait” message continuously on front panel, and it will not boot-up normally.

5-3. IC153

5-3-1. Solution

Replace IC153 on SMPS board.

5-3-2. How to troubleshoot (Countermeasure)

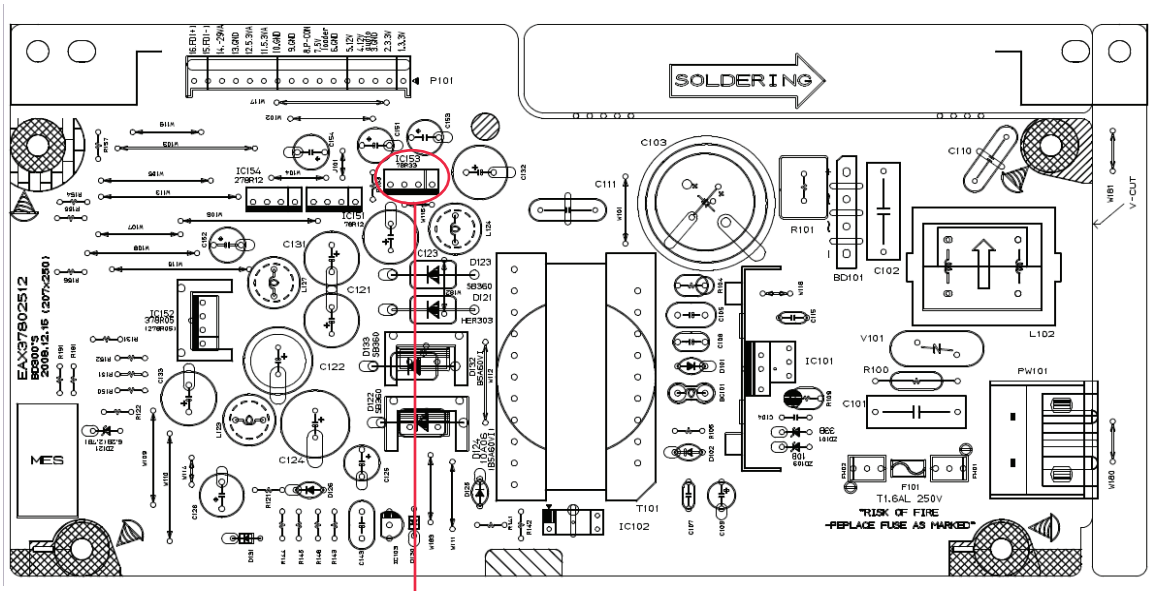
1) Please check 3.3V of CA710.

2) If 3.3V voltage doesn’t come out, check PWR_CTRL of JIG909(front board).
   --> If you figure out those power control doesn’t come out any signal level (or voltage), please replace IC901 of front board.

3) If P_CON_5.3V comes out 5V signal, replace IC153 of SMPS.

4) After changing it, if the set is still not booting, check MPEG IC(IC201). Refer to item 5-7.

5-3-3. Service hint (Any picture / Remark)



IC153 < SMPS board top view >

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COMPONENT REPAIR GUIDE

When you turn on your BD-P, it will display “Hello” or “Please wait” message continuously on front panel, and it will not boot-up normally.

5-4. X504

5-4-1. Solution

Replace X504 on main board.

5-4-2. How to troubleshoot (Countermeasure)

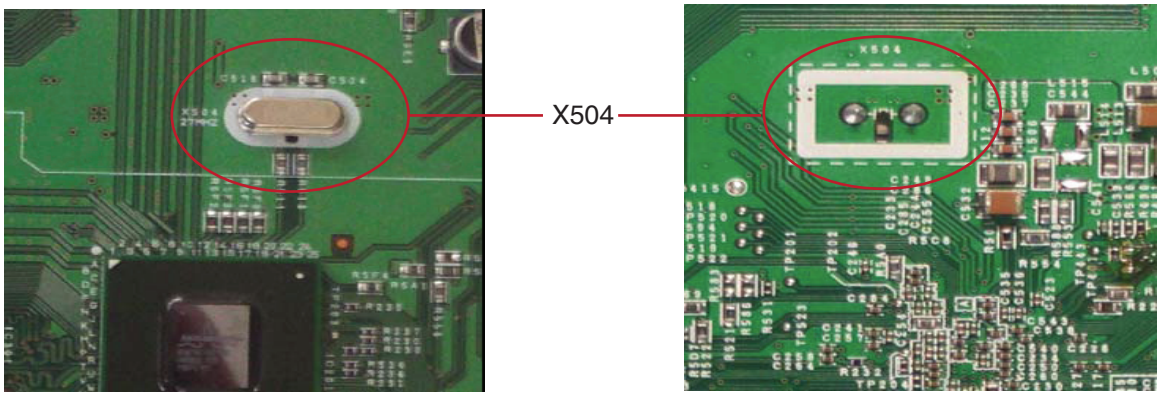
1) Please check the soldering status of 27Mhz crystal (X504)

2) Please check the frequency of 27Mhz crystal (X504)

3) If the crystal doesn’t oscillate, replace X504.

4) After changing it, if the set is still not booting, check MPEG IC(IC201). Refer to item 5-7.

5-4-3. Service hint (Any picture / Remark)



< Main board top view >

< Main board bottom view >

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COMPONENT REPAIR GUIDE

When you turn on your BD-P, it will display “Hello” or “Please wait” message continuously on front panel, and it will not boot-up normally.

5-5. IC402

5-5-1. Solution

Replace IC402 on main board.

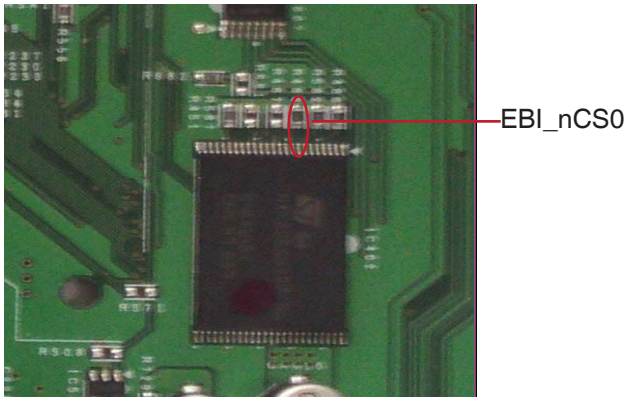
5-5-2. How to troubleshoot (Countermeasure)

1) Please check the IC402 on your eyes.

2) Check the /CE signal of #9 pin of IC402. (R488)
First, If the /CE signal is not operating normally during booting, try to change IC402.

3) After changing it, if the set is still not booting,
check MPEG IC(IC201) or DDR IC. Refer to items 5-7 & 5-6.

5-5-3. Service hint (Any picture / Remark)



< Main board top view >

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When you turn on your BD-P, it will display “Hello” or “Please wait” message continuously on front panel, and it will not boot-up normally.

5-6. IC301 ~ IC304

5-6-1. Solution

Replace IC301 ~ IC304 on main board.

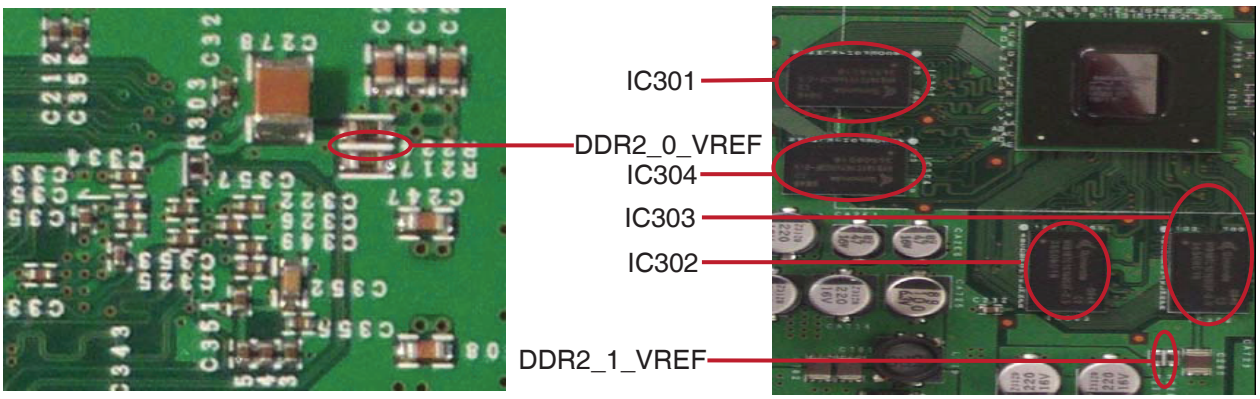
5-6-2. How to troubleshoot (Countermeasure)

1) Please check 0.9V of DDR2_1_VREF.(between R227 and R228).
   Please check 0.9V of DDR2_0_VREF.(between R217 and R224).
   Please check 1.8V of CA714.
   Please check 3.3V of CN701 pin #1 Please check the soldering status of 27Mhz crystal (X504)

2) If it doesn’t work even only one and IC706,IC704, IC153 are no problem,
   IC301,302,303,304(DDR memory) must be changed.

3) After changing it, if the set is still not booting,
   check MAIN PCB. Refer to item 5-8.

5-6-3. Service hint (Any picture / Remark)



< Main board top view >

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COMPONENT REPAIR GUIDE

When you turn on your BD-P, it will display “Hello” or “Please wait” message continuously on front panel, and it will not boot-up normally.

5-7. IC201

5-7-1. Solution

Replace IC201 on main board.

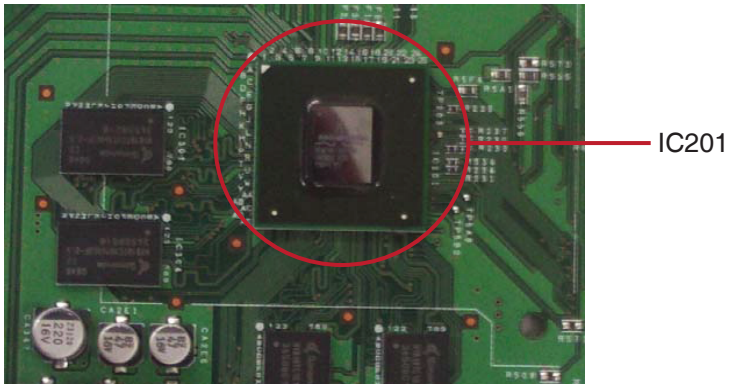
5-7-2. How to troubleshoot (Countermeasure)

1) Please Check 1.2V of CA723.
   Please Check 1.8V of CA714.
   Please Check 3.3V of CN701 pin #1.

2) If it doesn’t work even only one and IC706,IC704, IC153 are no problem,
   IC201(MPEG) must be changed.

3) After changing it, if the set is still NG, check main board. Refer to item 5-8.

5-7-3. Service hint (Any picture / Remark)



< Main board top view >

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COMPONENT REPAIR GUIDE

When you turn on your BD-P, it will display “Hello” or “Please wait” message continuously on front panel, and it will not boot-up normally.

5-8. Main board

5-8-1. Solution

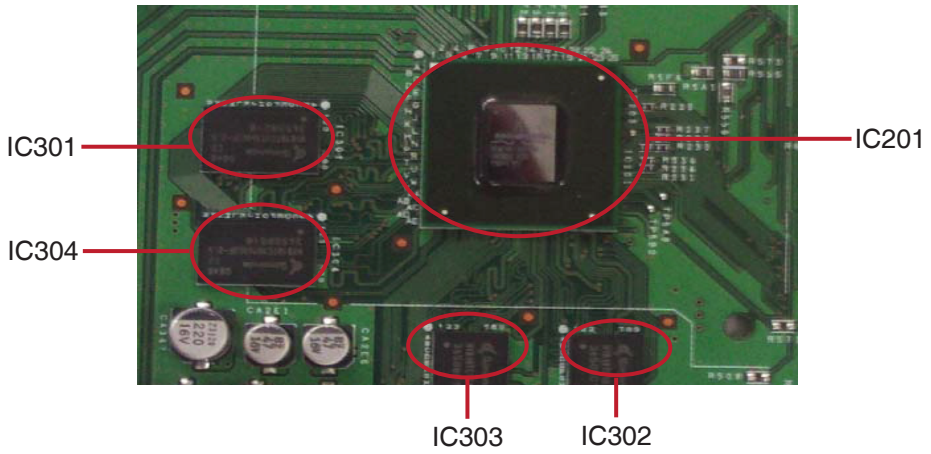
Replace main board.

5-8-2. How to troubleshoot (Countermeasure)

1) Please remove IC201 and IC301~304
and then check the Impedance between each signal (DATA, ADDRESS, and so on.)

2) If there is some Impedance (a few ohm or infinite ohm), PCB via might be broken.
and You’d better change MAIN board.

5-8-3. Service hint (Any picture / Remark)



< Main board top view >

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6. NO CONNECTION WHEN YOU TRY TO OPERATE NETWORK CONENTS (BD390)

When you connect You-tube , BD-live or Netflix, the “no connection “ message appears.

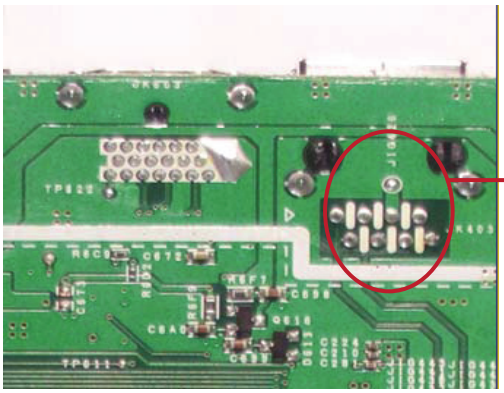
6-1. Solution

Replace JK403 on main board.

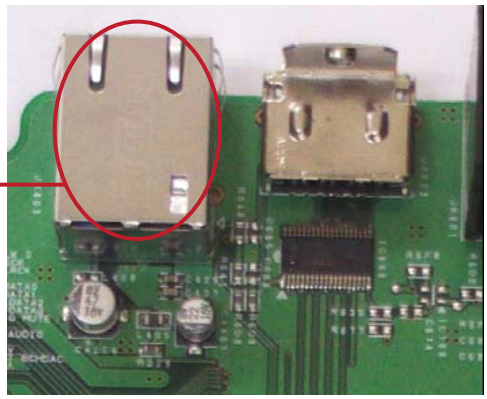
6-2. How to troubleshoot (Countermeasure)

1) Please check the Ethernet Jack (JK403) on your eye.
2) If there is no soldering problem, replace JK403.
3) After changing it, if the set is still NG, check MPEG IC(IC201). Refer to item 5-7.

6-3. Service hint (Any picture / Remark)



< Main board bottom view >



< Main board top view >

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COMPONENT REPAIR GUIDE

7. SHOWING BAD COLOR ,NO OUTPUT OR MIXED COLOR ON THE SCREEN USING HDMI. (BD390)

When unit is connected the TV using HDMI, picture shows bad color, no output or mixed color on the screen. But component output is ok.

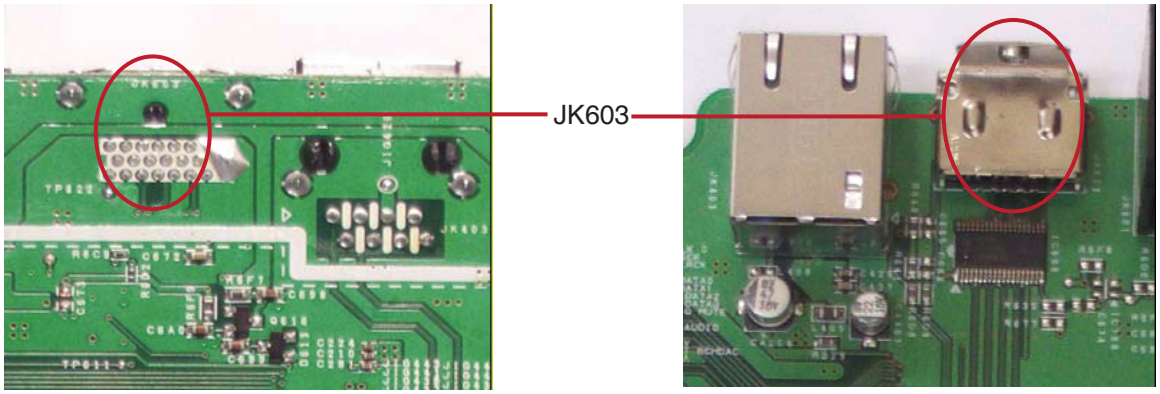
7-1. Solution

Replace JK603 on main board.

7-2. How to troubleshoot (Countermeasure)

1) Please check JK603, IC609 on your eyes.
2) If JK603 , IC609 PINS shorted because of solder problem, unsolder and remove shorted point.
3) If there is no soldering problem , replace JK603.
4) After changing it, if the set is still NG, check MPEG IC(IC201). Refer to item 5-7.

7-3. Service hint (Any picture / Remark)



< Main board bottom view >

< Main board top view >

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COMPONENT REPAIR GUIDE

8. NO CONNECTION WHEN YOU TRY TO OPERATE NETWORK CONTENTS WITH WIRELESS (BD390)

When you connect You-tube , BD-live or Netflix through the wireless , the “no connection “ message appears.

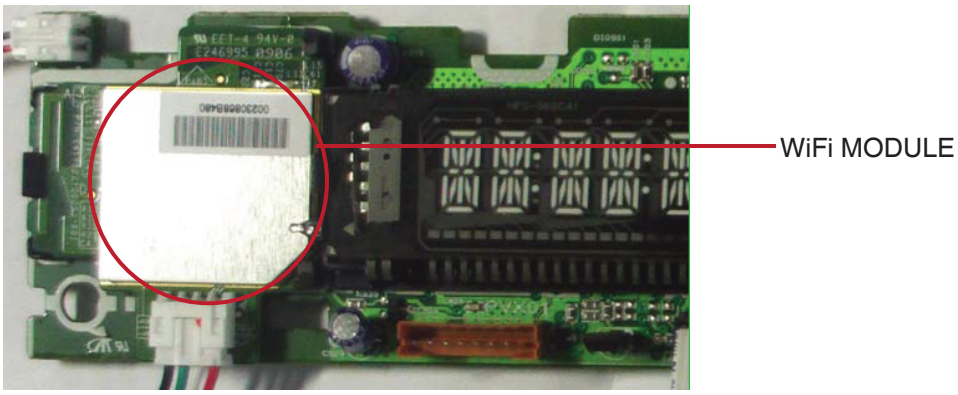
8-1. Solution

Replace WiFi module on front board.

8-2. How to troubleshoot (Countermeasure)

1) Please check the WiFi module on your eye.
2) If there is no soldering problem, replace WiFi module.
3) After changing it, if the set is still NG, check MPEG IC(IC201). Refer to item 5-7.

8-3. Service hint (Any picture / Remark)



< WiFi module top view >

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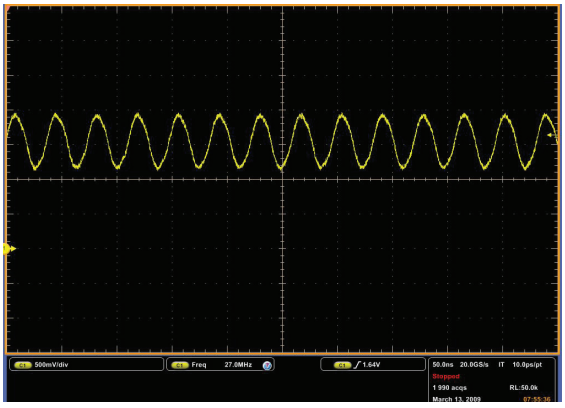
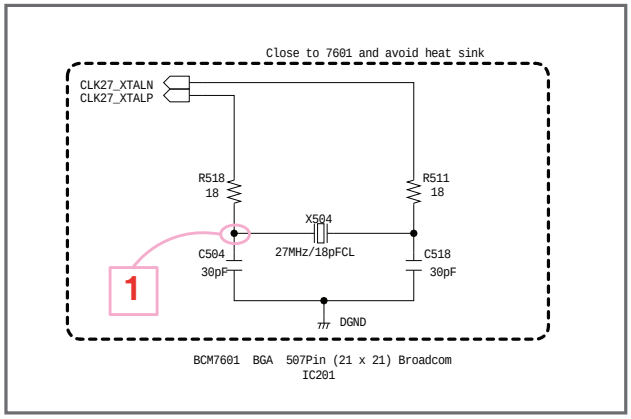
WAVEFORMS

1. SYSTEM PART-1

1



7601 XTAL (27MHz)



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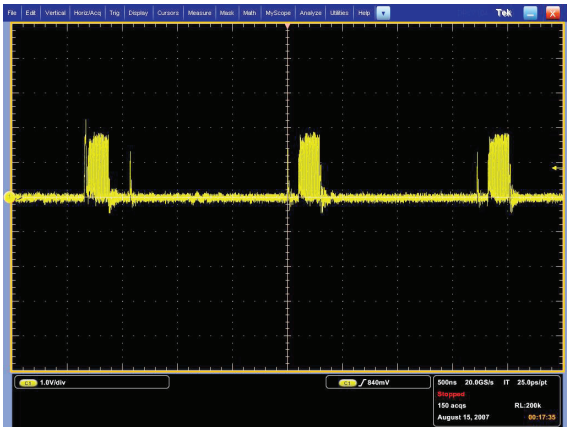
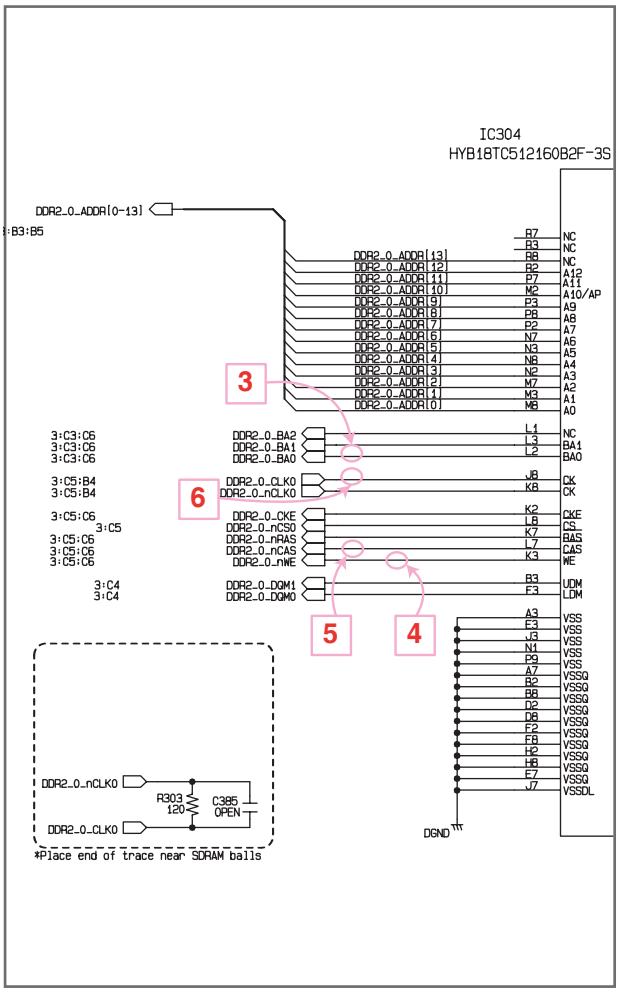
2. SYSTEM PART-2 (SYSTEM MEMORY)

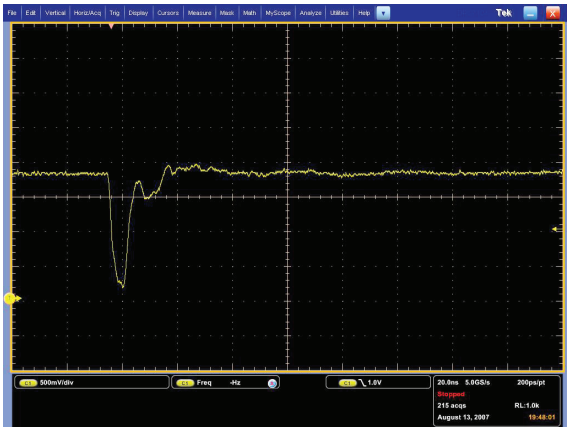
3



7601 DDR2_0_BA0

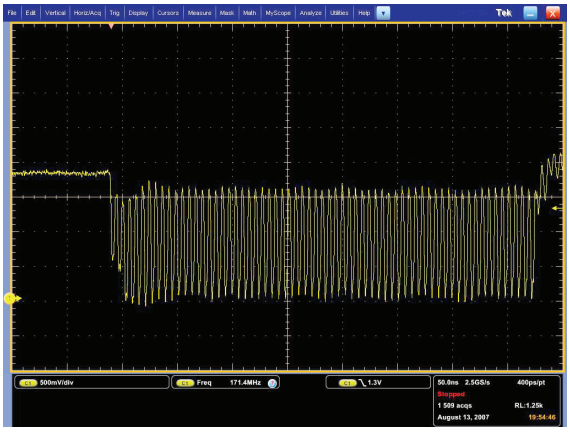


4



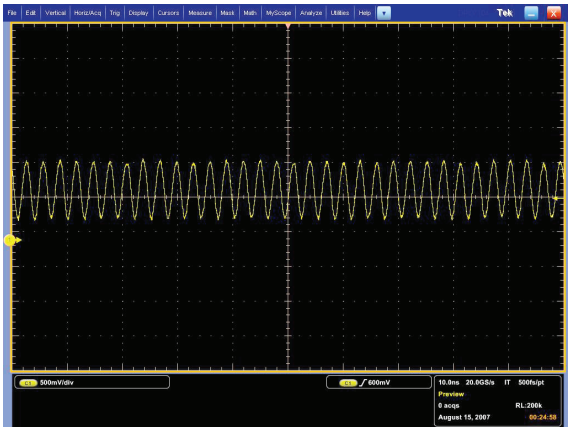
7601 DDR2_0_nWE

5



7601 DDR2_0_nCAS

6



7601 DDR2_0_CLK0

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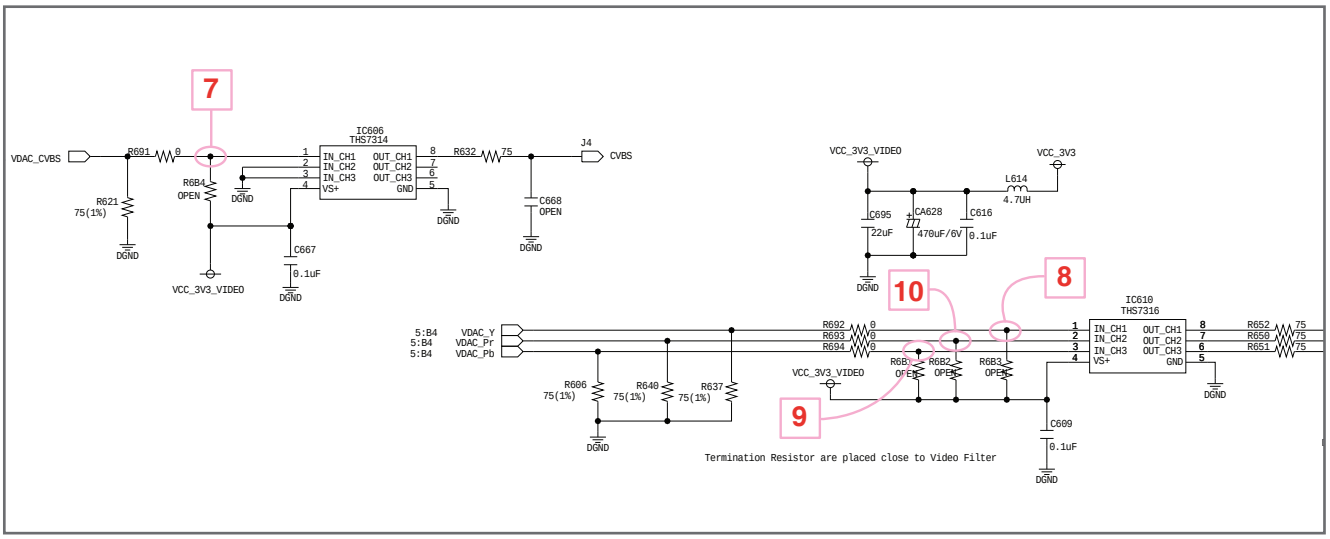
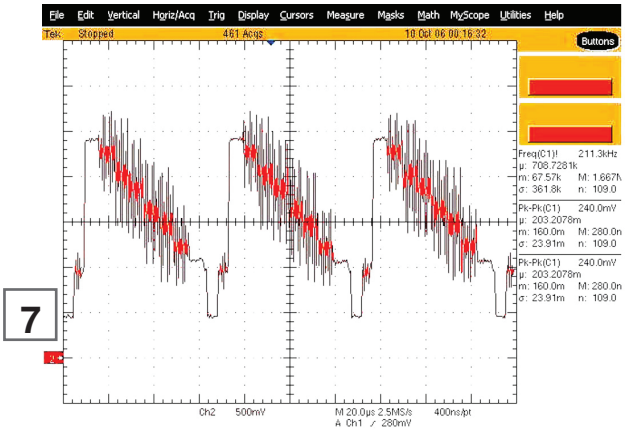
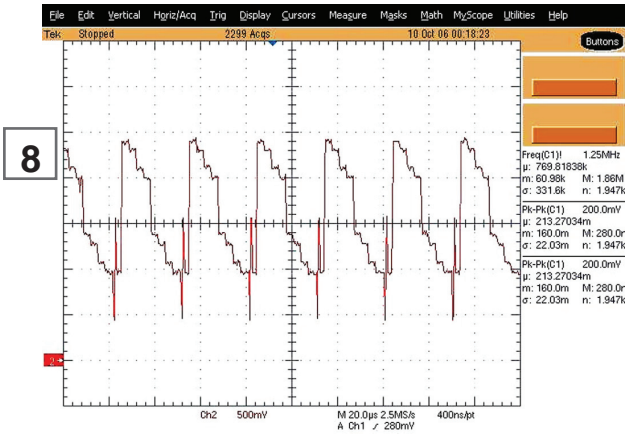
3. VIDEO PART-1 (100% FULL COLOR-BAR)

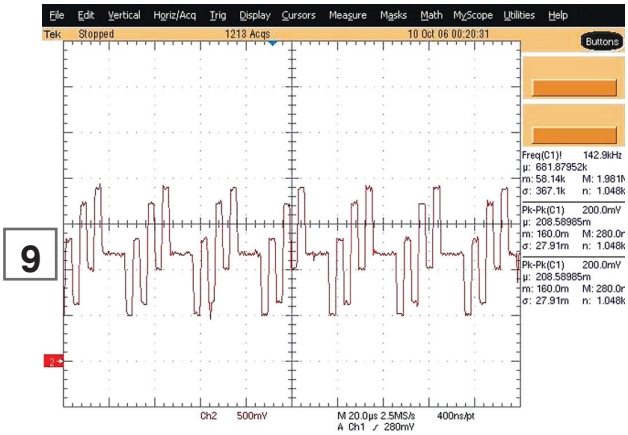




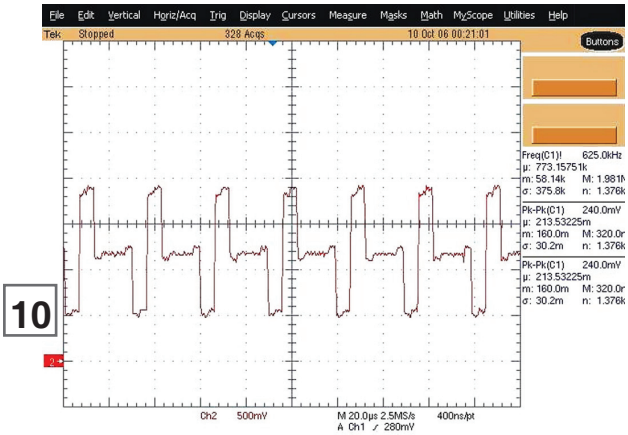
VDAC_CVBS



VDAC1_Y



VDAC2_Pb



VDAC3_Pr

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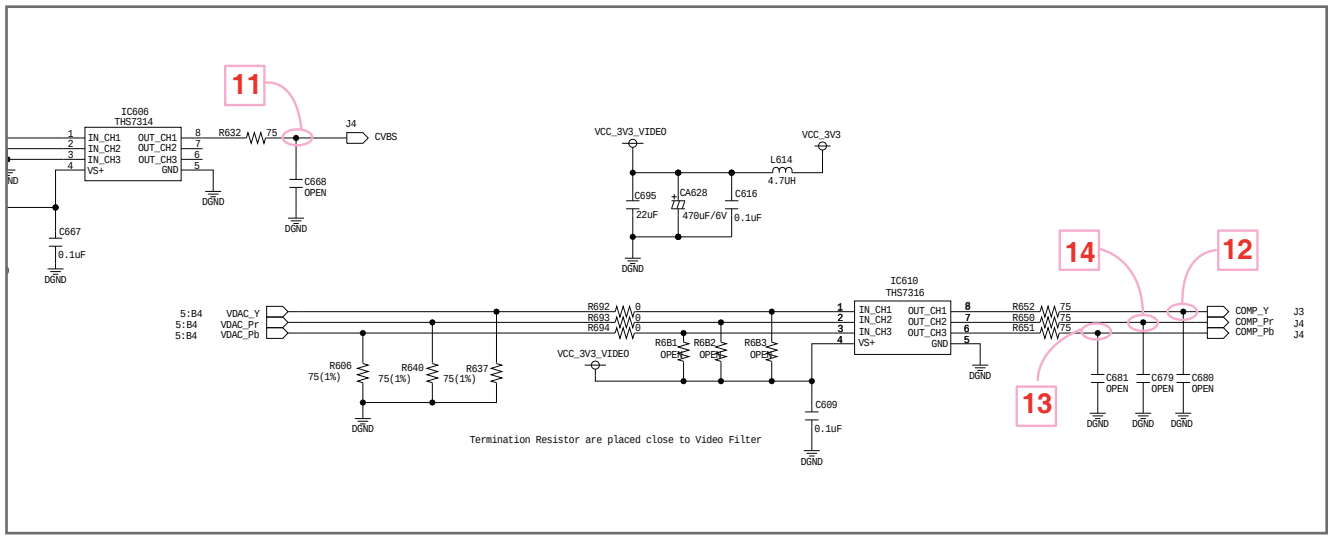
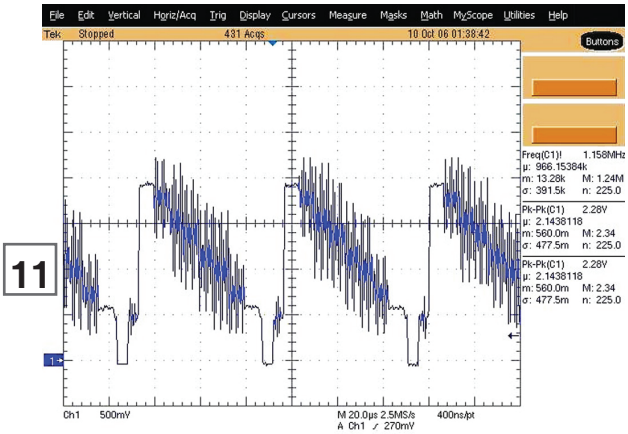
4. VIDEO PART-2 (100% FULL COLOR-BAR)





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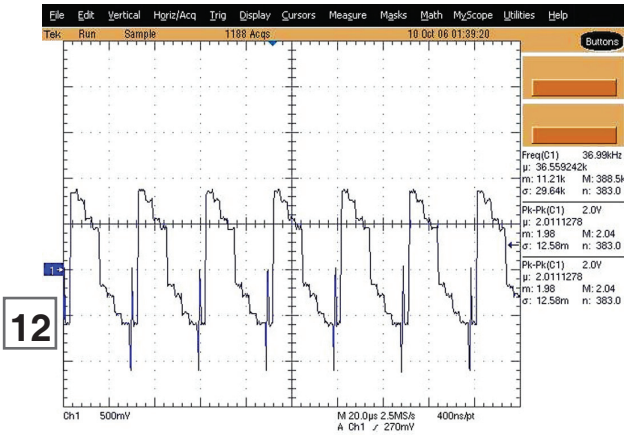

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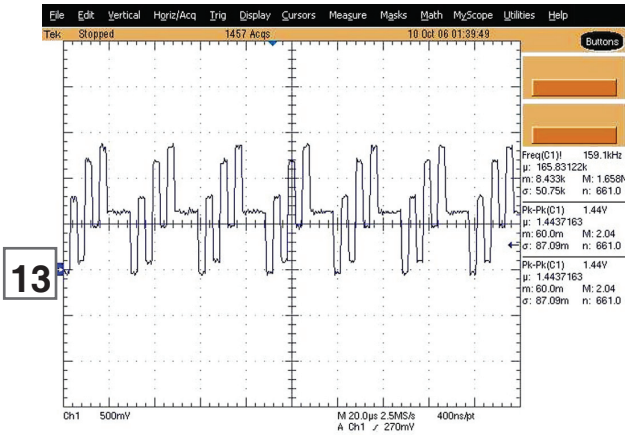
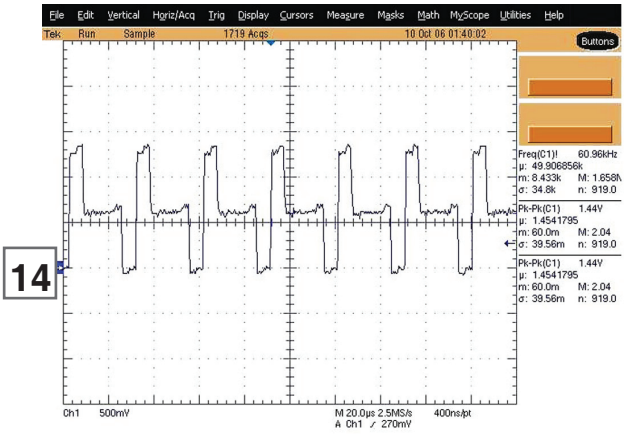


COMP_Pb



COMP_Pr

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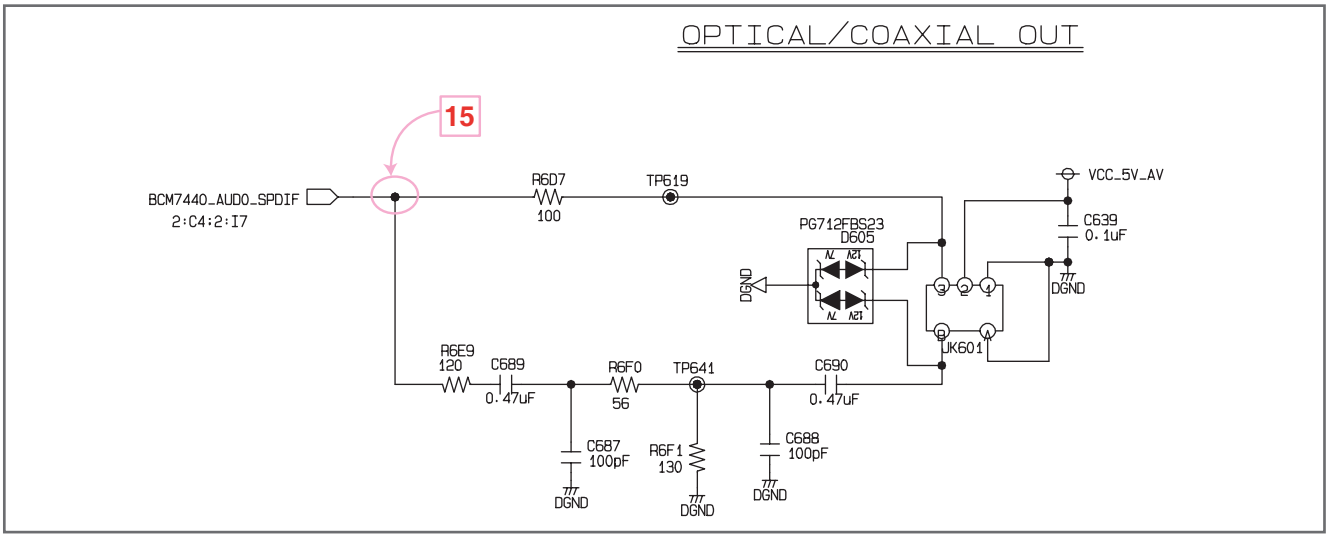
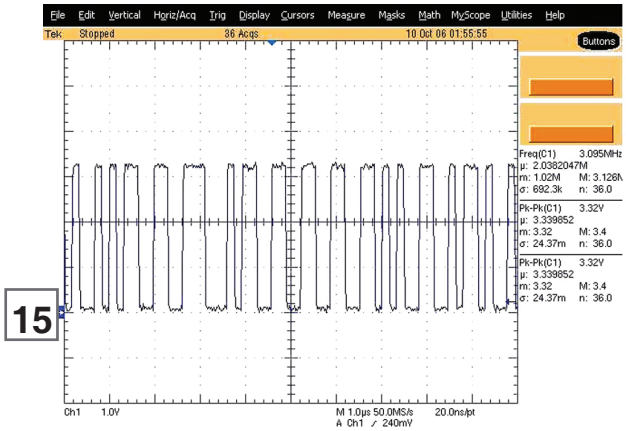
5. AUDIO PART (S/PDIF)





7601_AUD0_SPDIF

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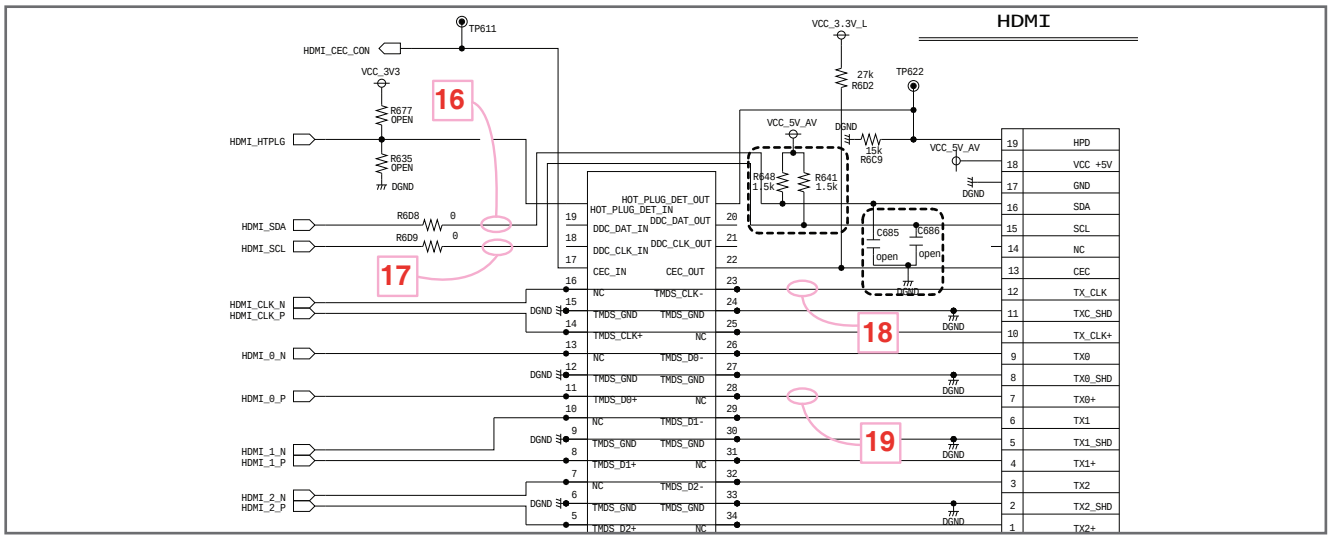
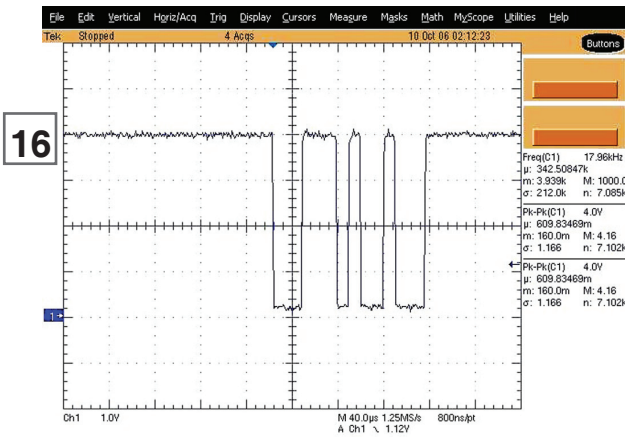
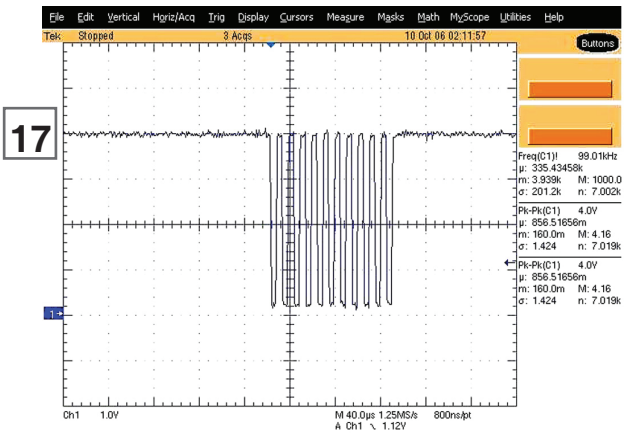
6. HDMI PART





9134_12C_SDA



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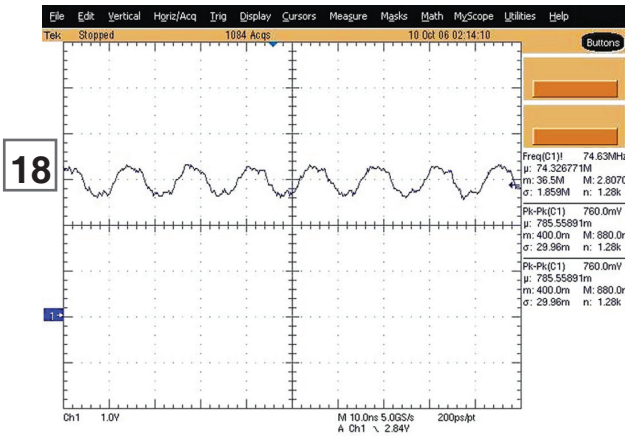
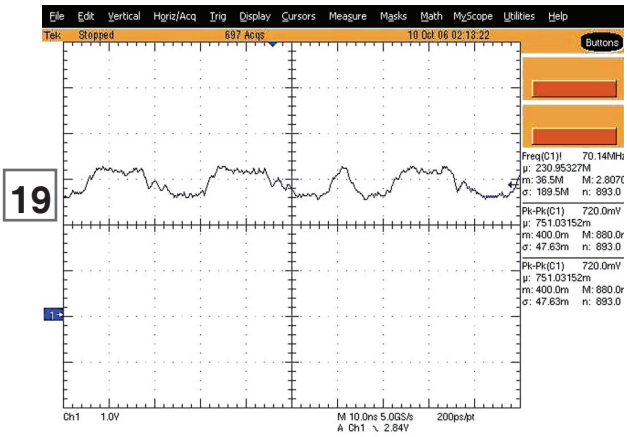


HDMI_CLK



HDMI_DATA

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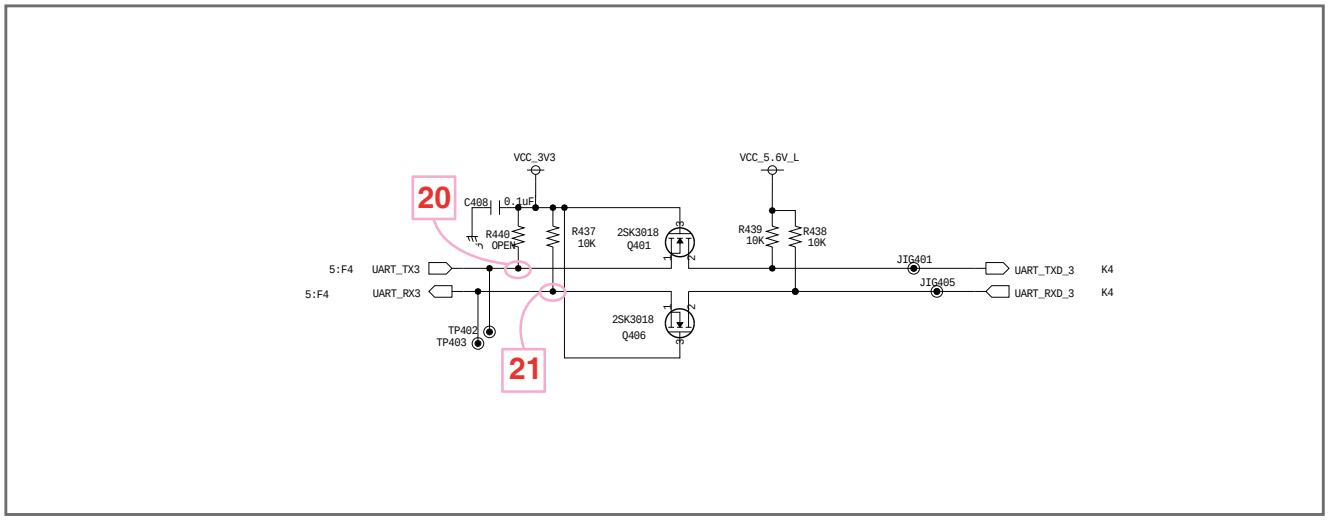
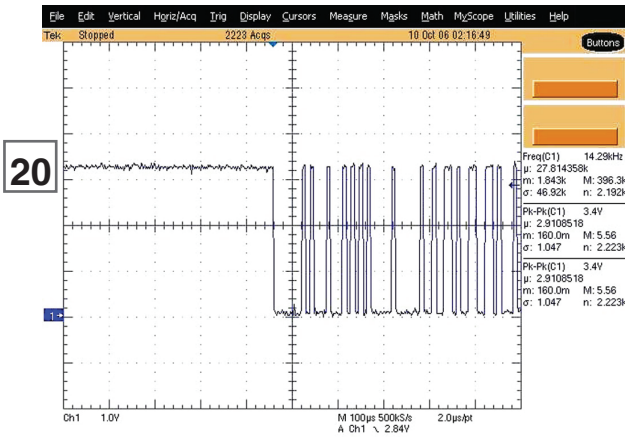
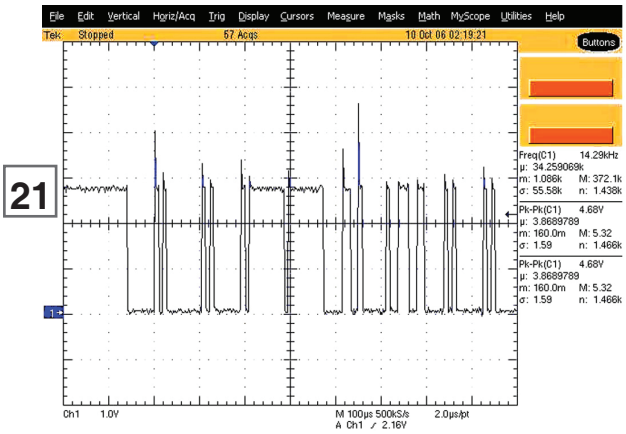
7. FRONT I/F PART





UART_TXD_0



UART_RXD_0

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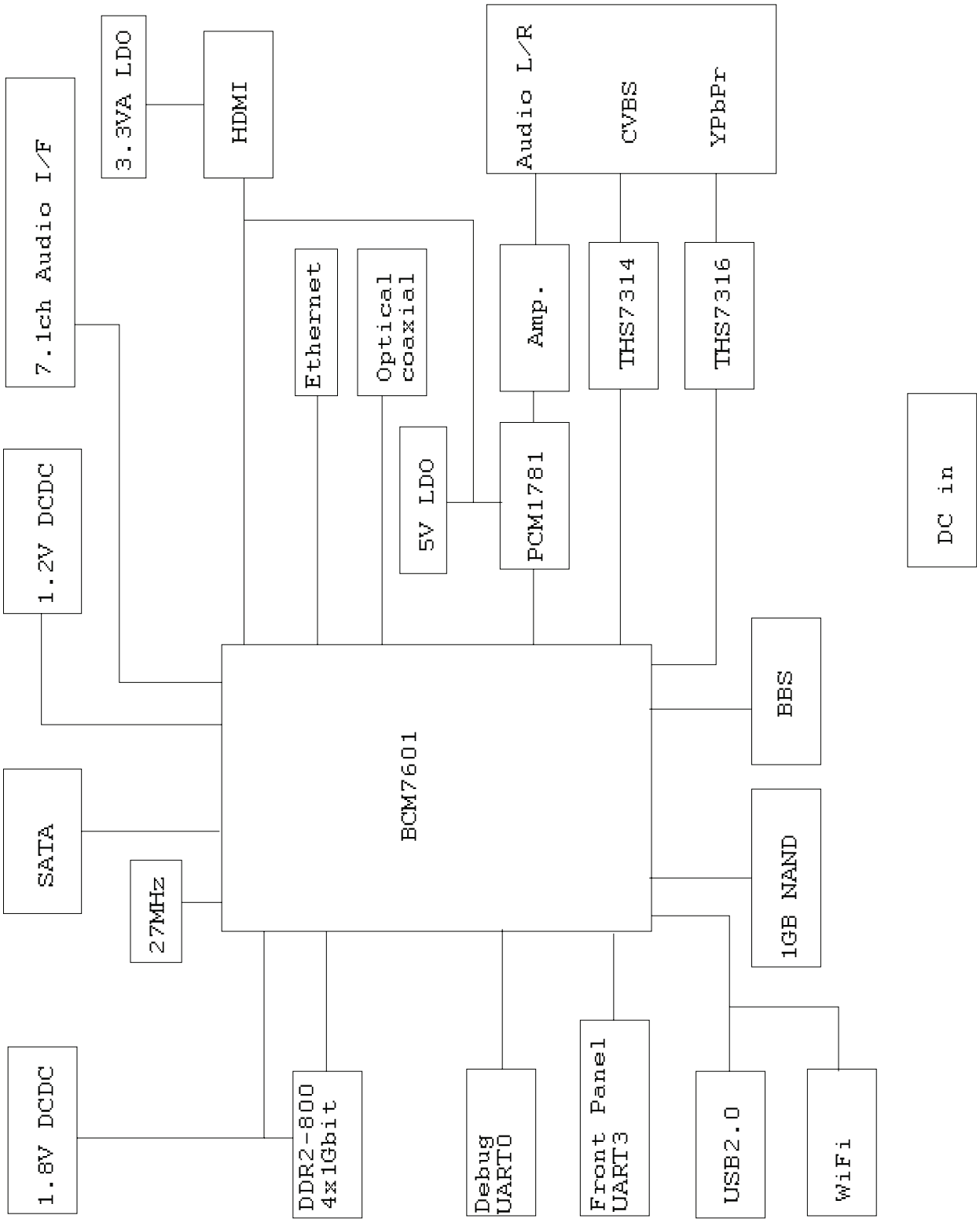
BLOCK DIAGRAMS

1. OVERALL BLOCK DIAGRAM



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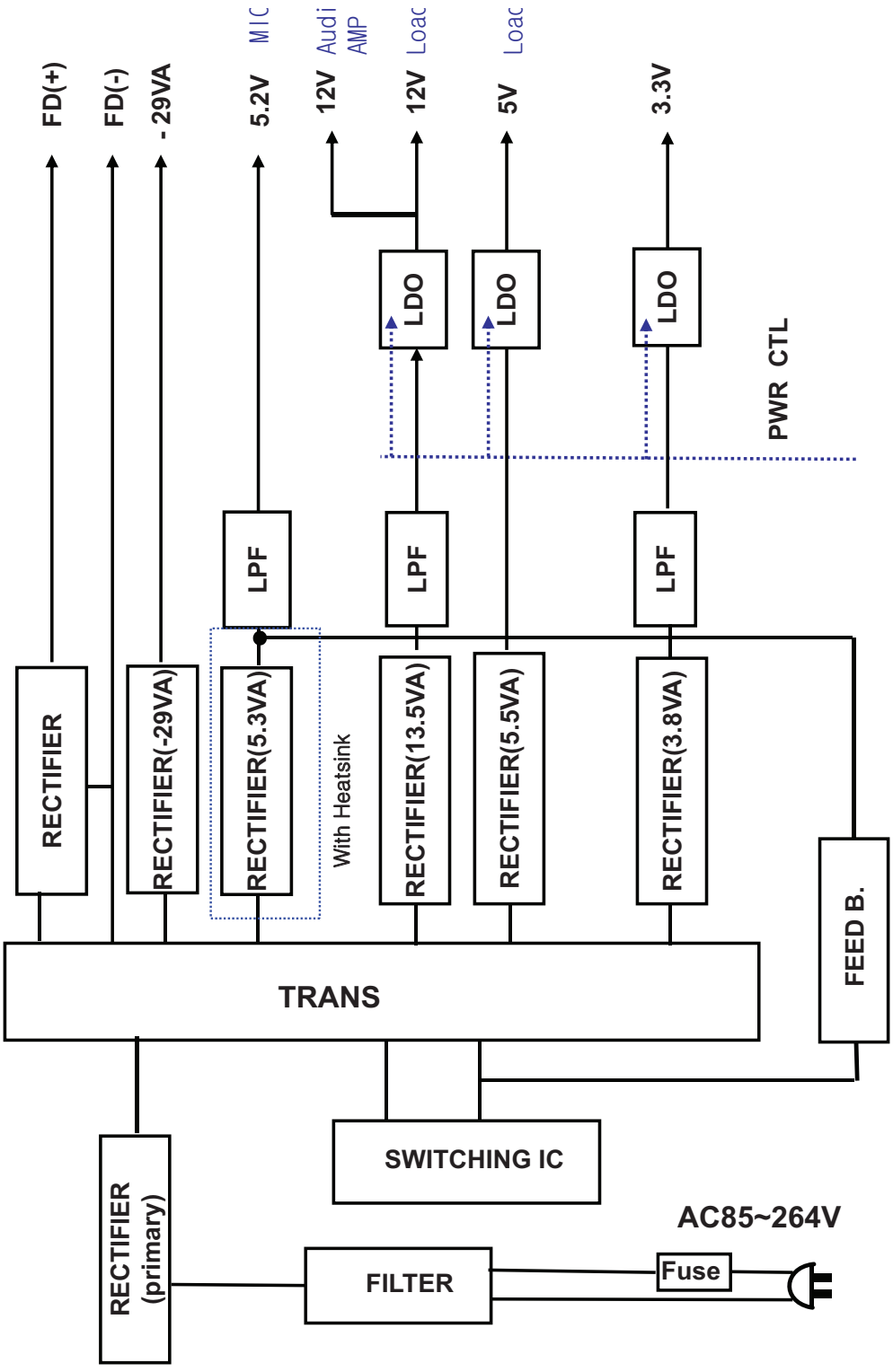
2. SMPS BLOCK DIAGRAM



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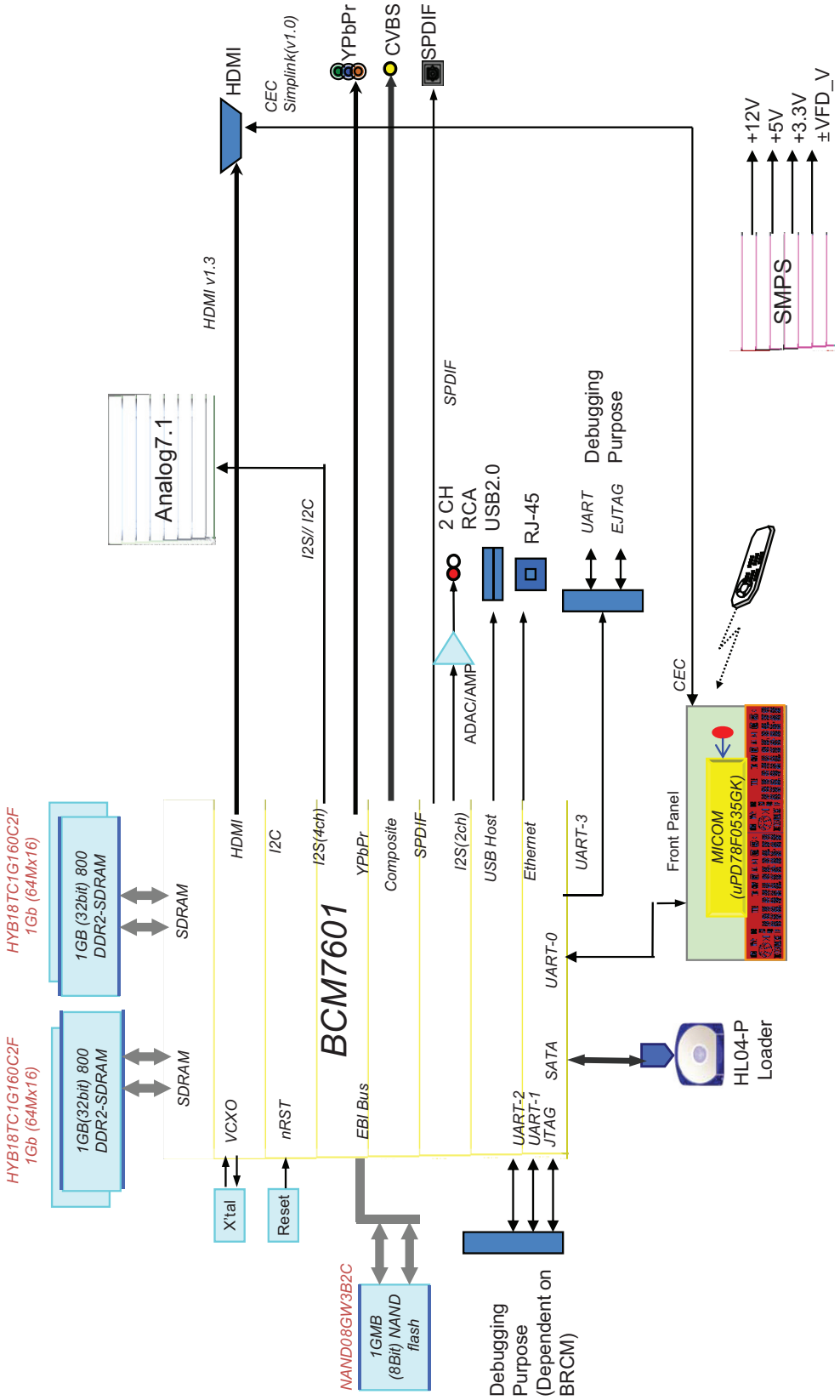
3. SYSTEM STRUCTURE BLOCK DIAGRAM



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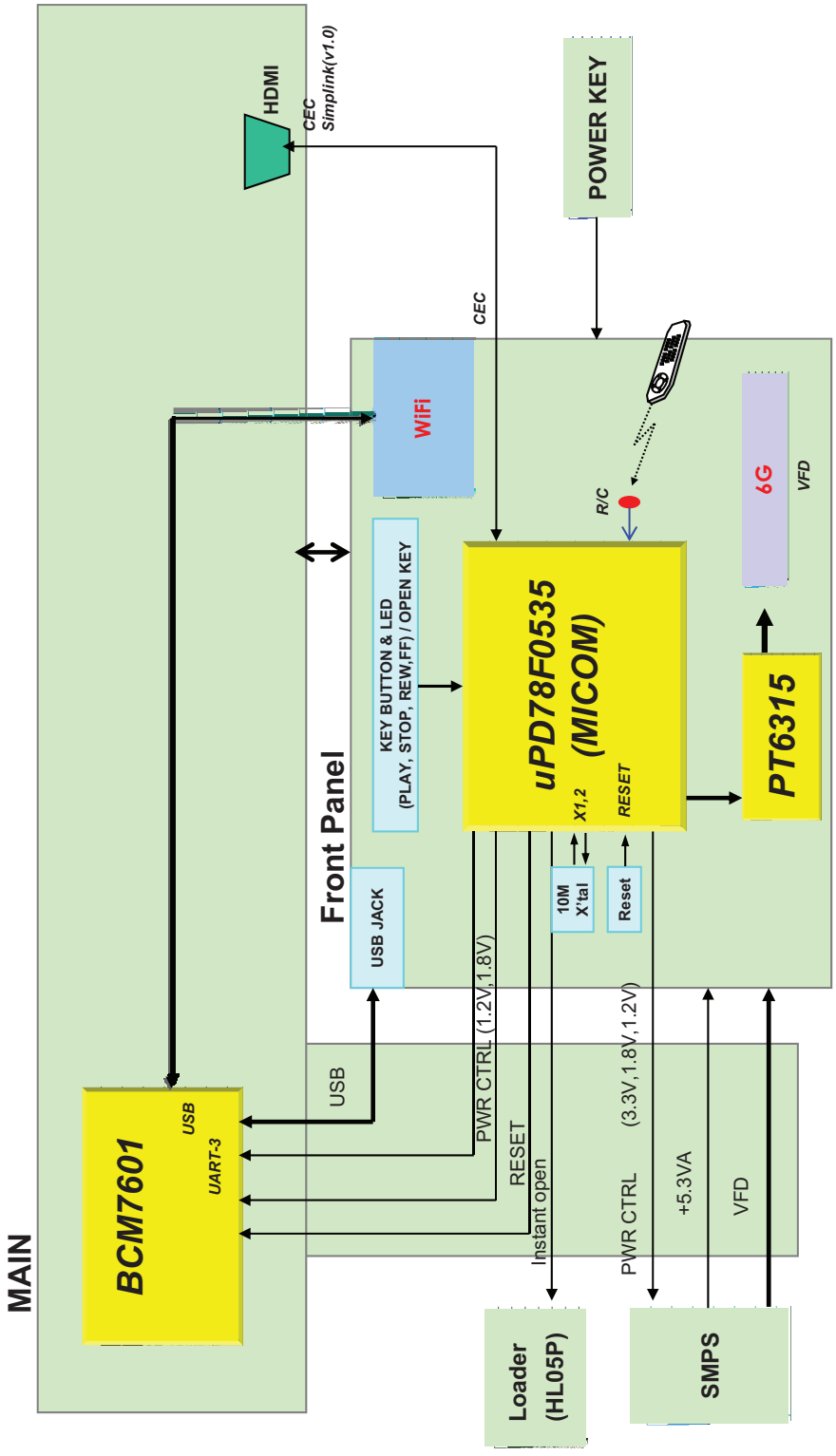
4. FRONT PART BLOCK DIAGRAM



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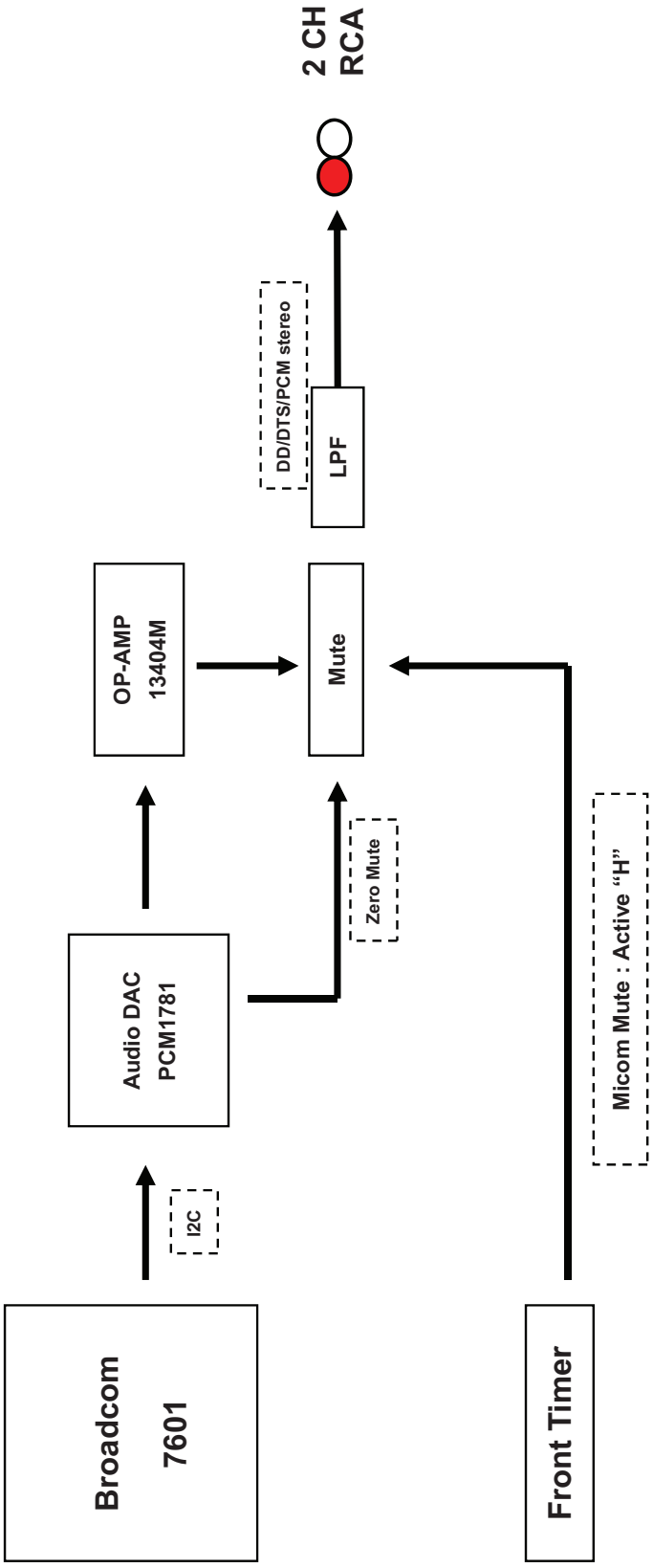
5. 2CH AUDIO INTERFACE BLOCK DIAGRAM



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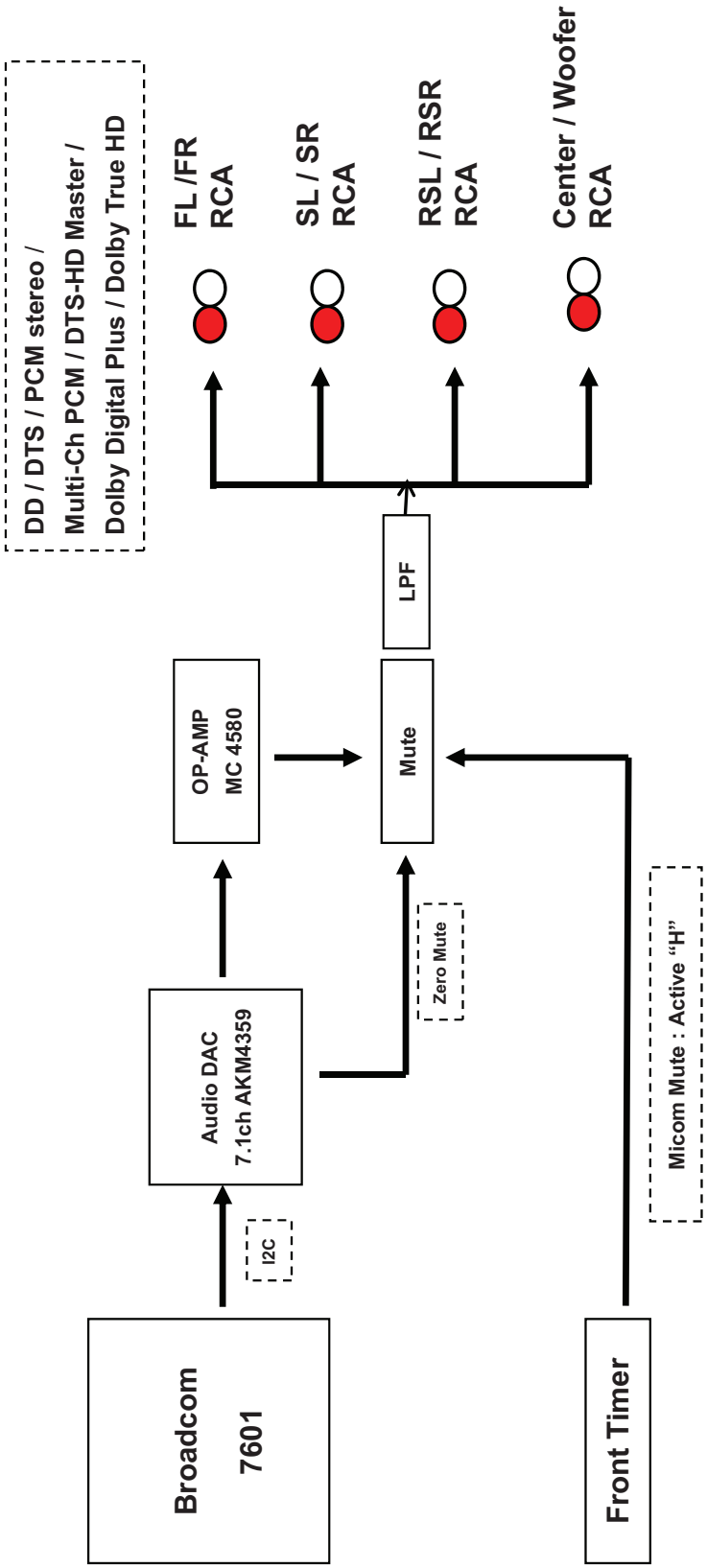
6. 7.1CH AUDIO INTERFACE BLOCK DIAGRAM



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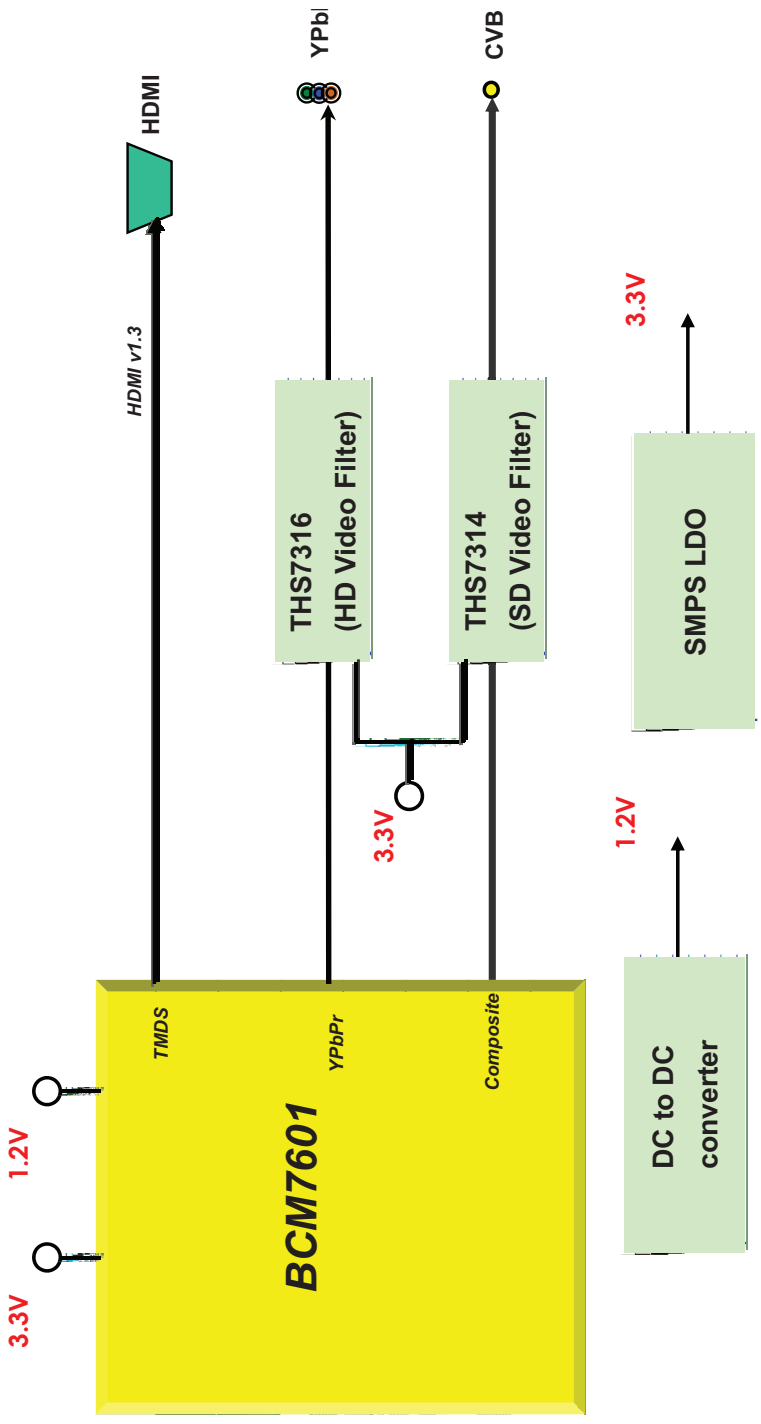
7. VIDEO BLOCK DIAGRAM



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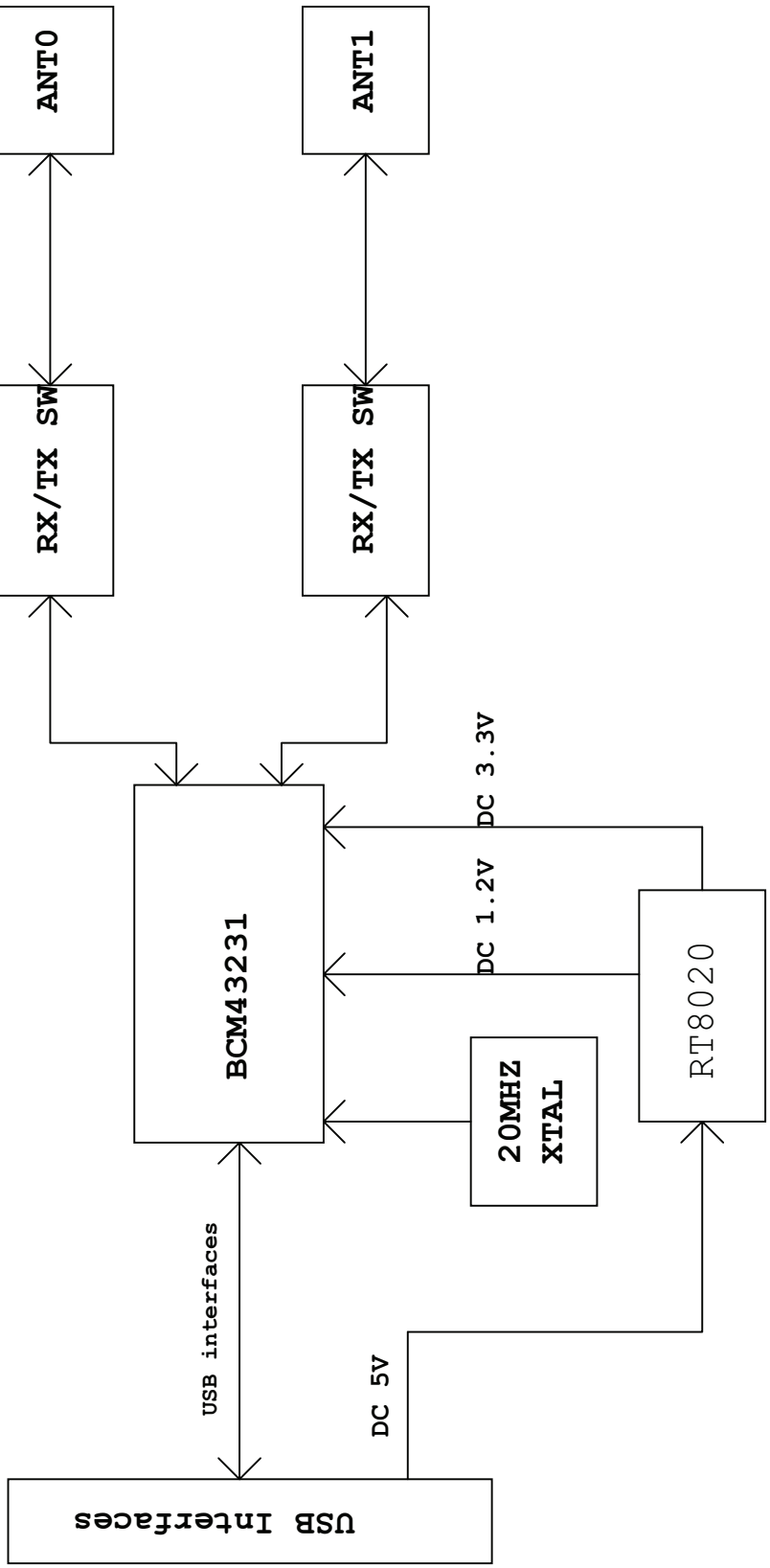
8. Wi-Fi BLOCK DIAGRAM



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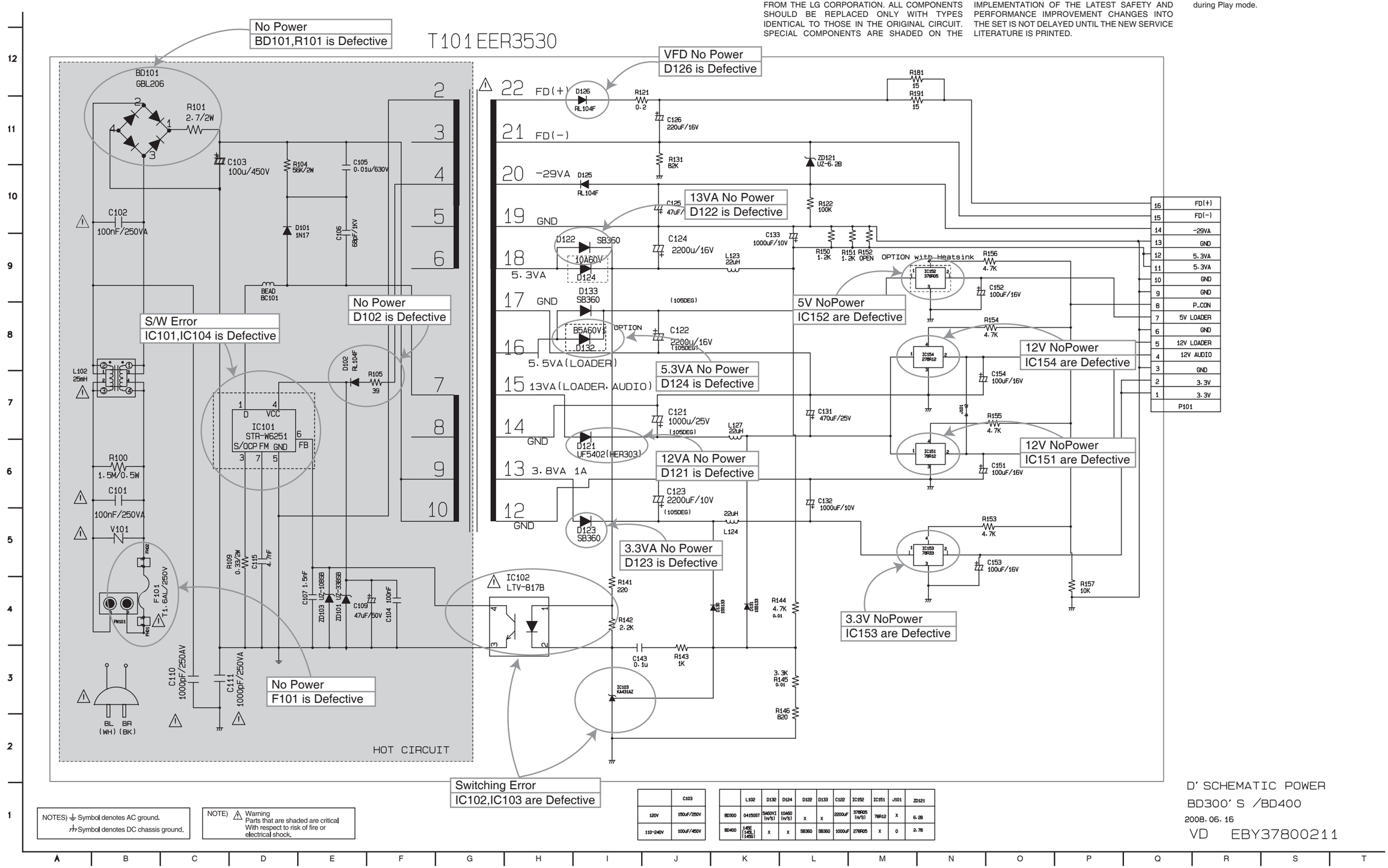
CIRCUIT DIAGRAMS
1. SMPS CIRCUIT DIAGRAM

IMPORTANT SAFETY

WHEN SERVICING THIS CHASSIS, UNDER NO CIRCUMSTANCES SHOULD THE ORIGINAL DESIGN BE MODIFIED OR ALTERED WITHOUT PERMISSION FROM THE LG CORPORATION. ALL COMPONENTS SHOULD BE REPLACED ONLY WITH TYPES IDENTICAL TO THOSE IN THE ORIGINAL CIRCUIT. SPECIAL COMPONENTS ARE SHADED ON THE SCHEMATIC FOR EASY IDENTIFICATION. THIS CIRCUIT DIAGRAM MAY OCCASIONALLY DIFFER FROM THE ACTUAL CIRCUIT USED. THIS WAY, IMPLEMENTATION OF THE LATEST SAFETY AND PERFORMANCE IMPROVEMENT CHANGES INTO THE SET IS NOT DELAYED UNTIL THE NEW SERVICE LITERATURE IS PRINTED.

NOTE :

1. Shaded(■) parts are critical for safety. Replace only with specified part number.
2. Voltages are DC-measured with a digital voltmeter during Play mode.



	C103
120V	150uF/250V
110-240V	100uF/450V

	L102	D132	D124	D122	D133	C122	IC152	IC151	J101	ZD121
BD300	04150ST	5A60V3 (HVS)	10A60 (HVS)	X	X	2200uF	378R05 (HV3V)	78R12	X	6.2B
BD400	1.45E (145E) (145G)	X	X	SB360	SB360	1000uF	276R05	X	0	2.7B

NOTES) ⏚ Symbol denotes AC ground.
⏚ Symbol denotes DC chassis ground.

NOTE) ⚠ Warning
Parts that are shaded are critical With respect to risk of fire or electrical shock.

D' SCHEMATIC POWER
BD300' S /BD400
2008. 06. 16
VD EBY37800211

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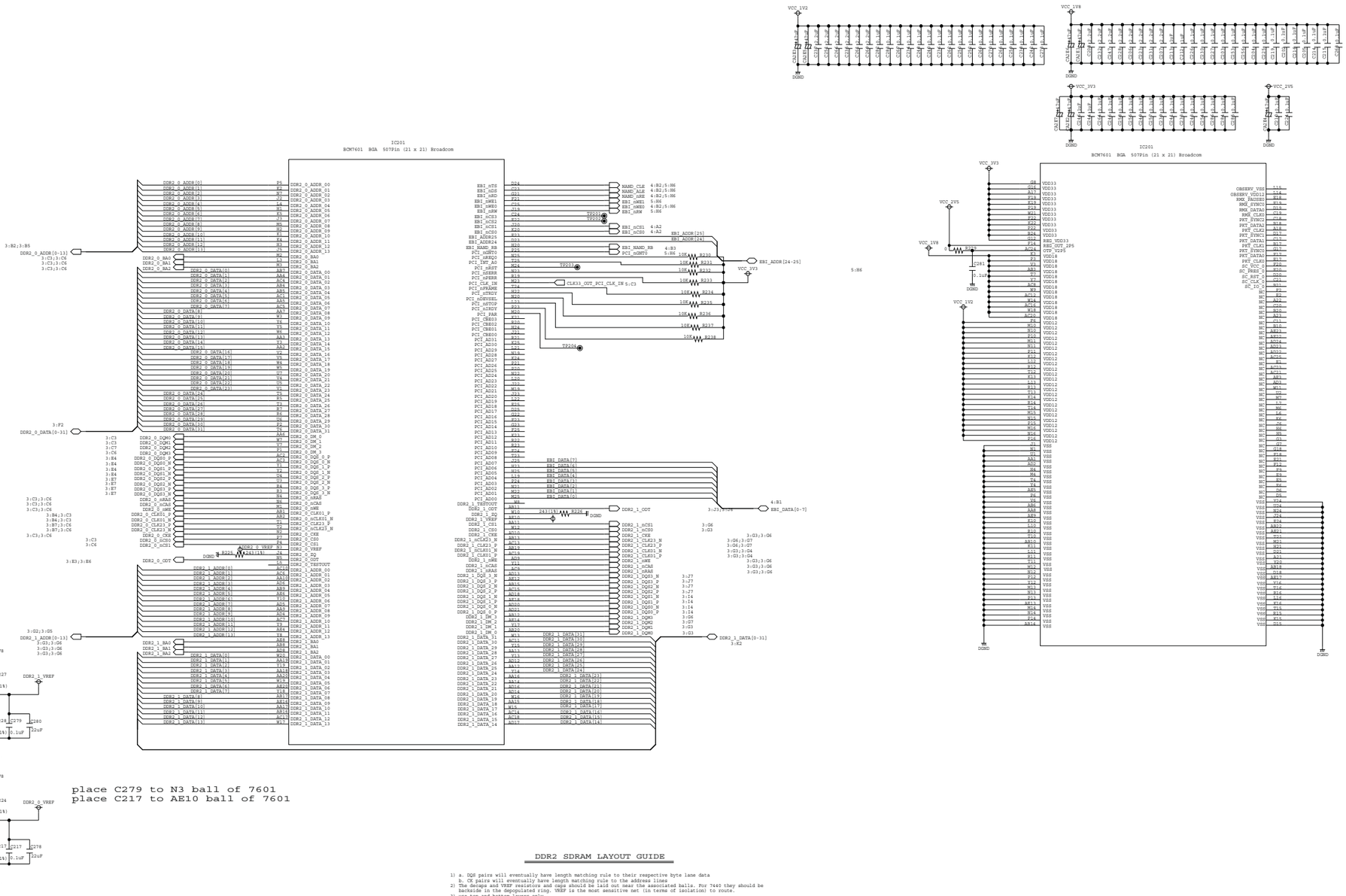
2. BCM7601-2 CIRCUIT DIAGRAM



DDR2 SDRAM LAYOUT GUIDE

1) a. DQS pairs will eventually have length matching rule to their respective byte lane data
   b. CK pairs will eventually have length matching rule to the address lines
2) The decaps and VREF resistors and caps should be laid out near the associated balls. For 7440 they should be backside in the depopulated ring. VREF is the most sensitive net (in terms of isolation) to route.
3) use top and bottom layers only.
4) Lay out escape plan per attached sketch
5) Complete the layout of the wires in the following order, keeping signals on their layer as much as possible:
   CK pairs
   DQS diff pairs
   DQ and DM
   remaining signals
6) Signals can be freely substituted within the following groups: [RS] if this is done, the schematic should be updated to match
   DQ[7:0] DQ[15:8] DQ[23:16] DQ[31:24]
7) Diff pairs should be routed together 4 mil etch 4 mil spacing
8) Signals should be routed 4 mil etch 4 mil space min, 8 mil spacing mostly.
9) Keep data lines separate from address lines, to avoid x-talk between the two
10) Prepare wire length report and schedule a review
11) LENGTH RULE: Data bits DDR2_n_DATA[31:0] <- 1.5"
12) Keep decoupling caps on back side out from beneath backing plate.
13) Route clocks as differential pairs - Match differential impedance
    60 Ohm to plane,
    120 Ohm on pair

2009.2.16

2. BCM7601-2

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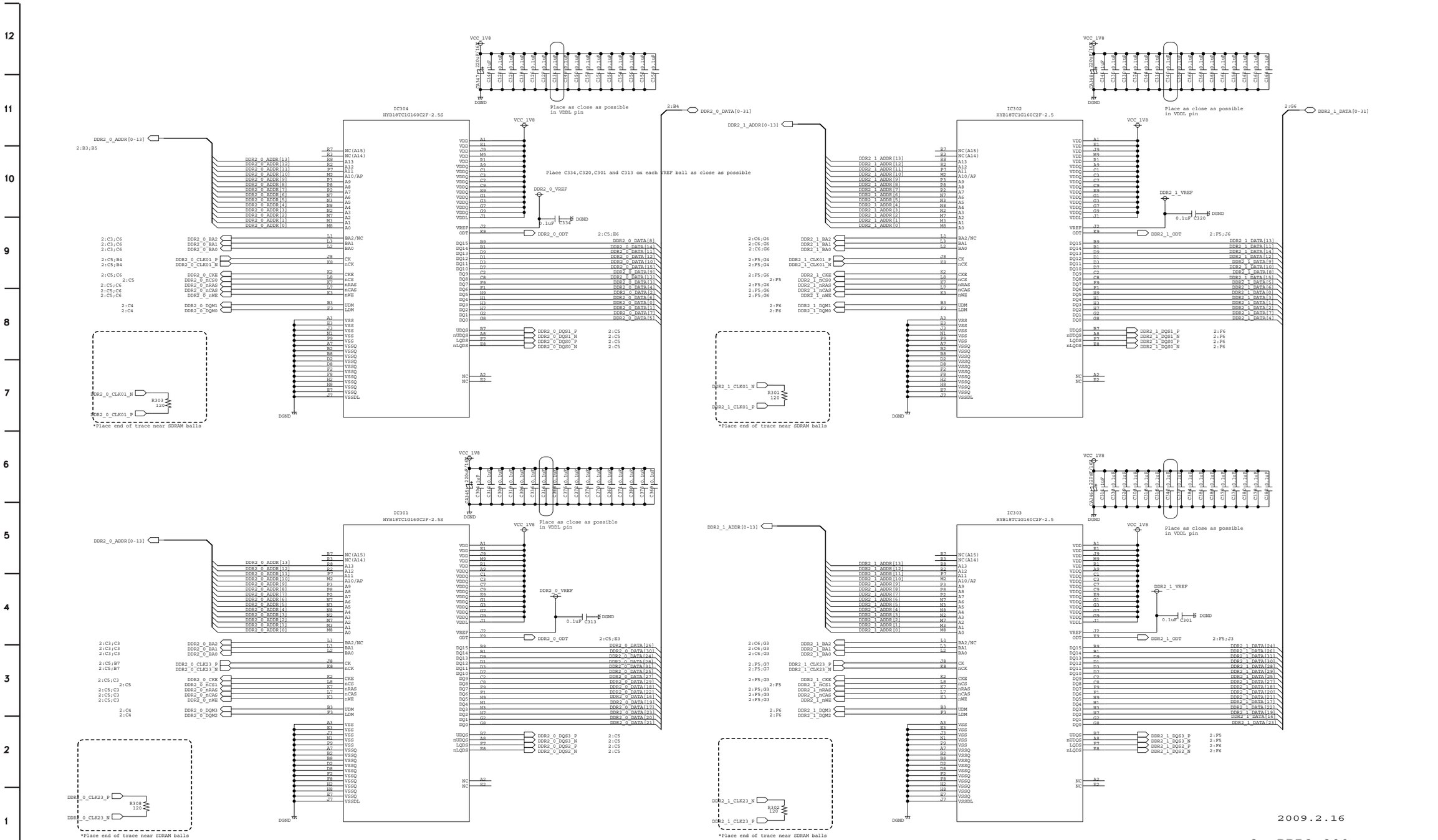
3. DDR2-800 CIRCUIT DIAGRAM



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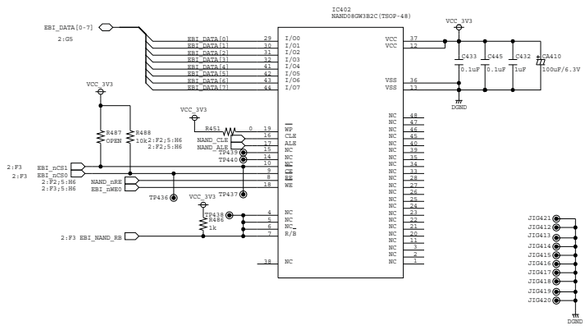
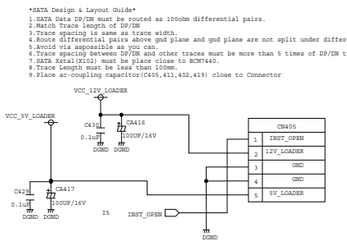
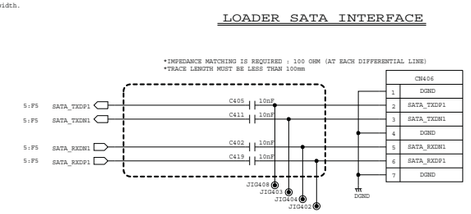
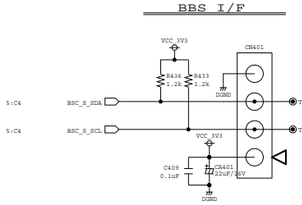
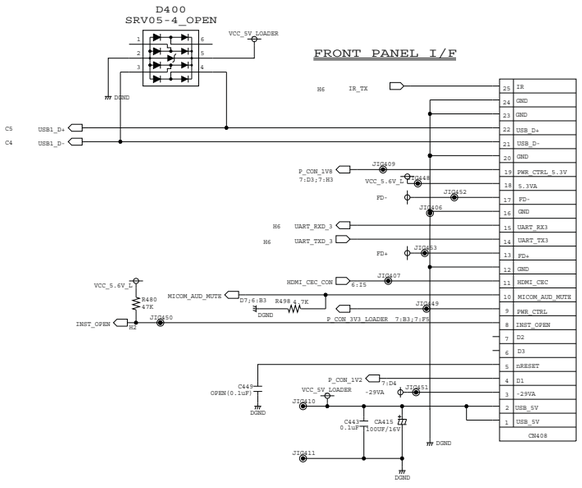
4. NAND, SATA INTERFACE, ETHERNET CIRCUIT DIAGRAM

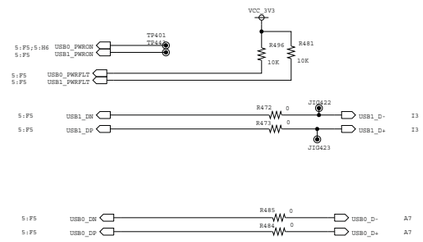




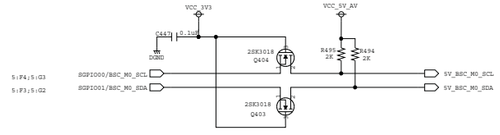


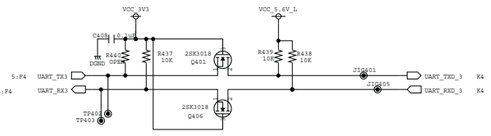


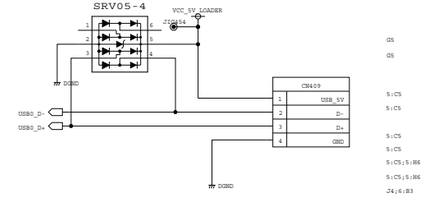


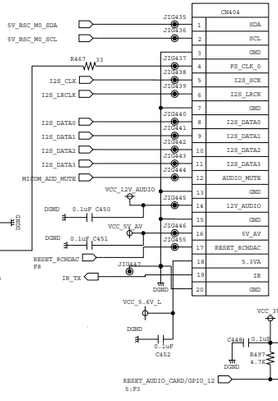


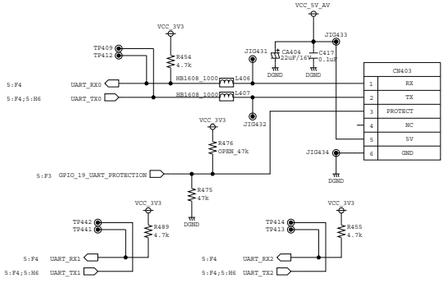
USB Design & Layout Guide
1.USB Data DP/DN must be routed as 100ohm differential pairs.
2.Match Trace length of DP/DN
3.Trace spacing is same as trace width.
4.Route differential pairs above gnd plane and gnd plane are not split under differential pairs.
5.Avoid via aspossible as you can.
6.Trace spacing between DP/DN and other traces must be more than 5 times of DP/DN trace width.
7.Consider current upto 500mA.
8.Consider abrupt USB power short.

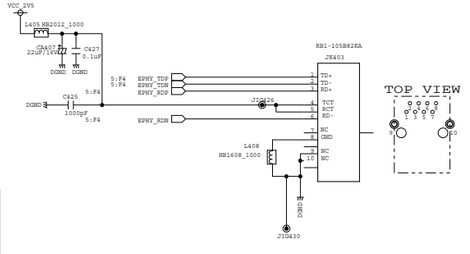












*IMPEDANCE MATCHING IS REQUIRED : 100 OHM (AT EACH DIFFERENTIAL LINE)

Ethernet Design & Layout Guide
1.Eth Data DP/DN must be routed as 100ohm differential pairs.
2.Match Trace length of DP/DN
3.Trace spacing is same as trace width.
4.Route differential pairs above gnd plane and gnd plane are not split under differential pairs.
5.Avoid via aspossible as you can.
6.Trace spacing between DP/DN and other traces must be more than 5 times of DP/DN trace width.

2009.2.16
4.NAND,SATA
INTERFACE,ETHERNET

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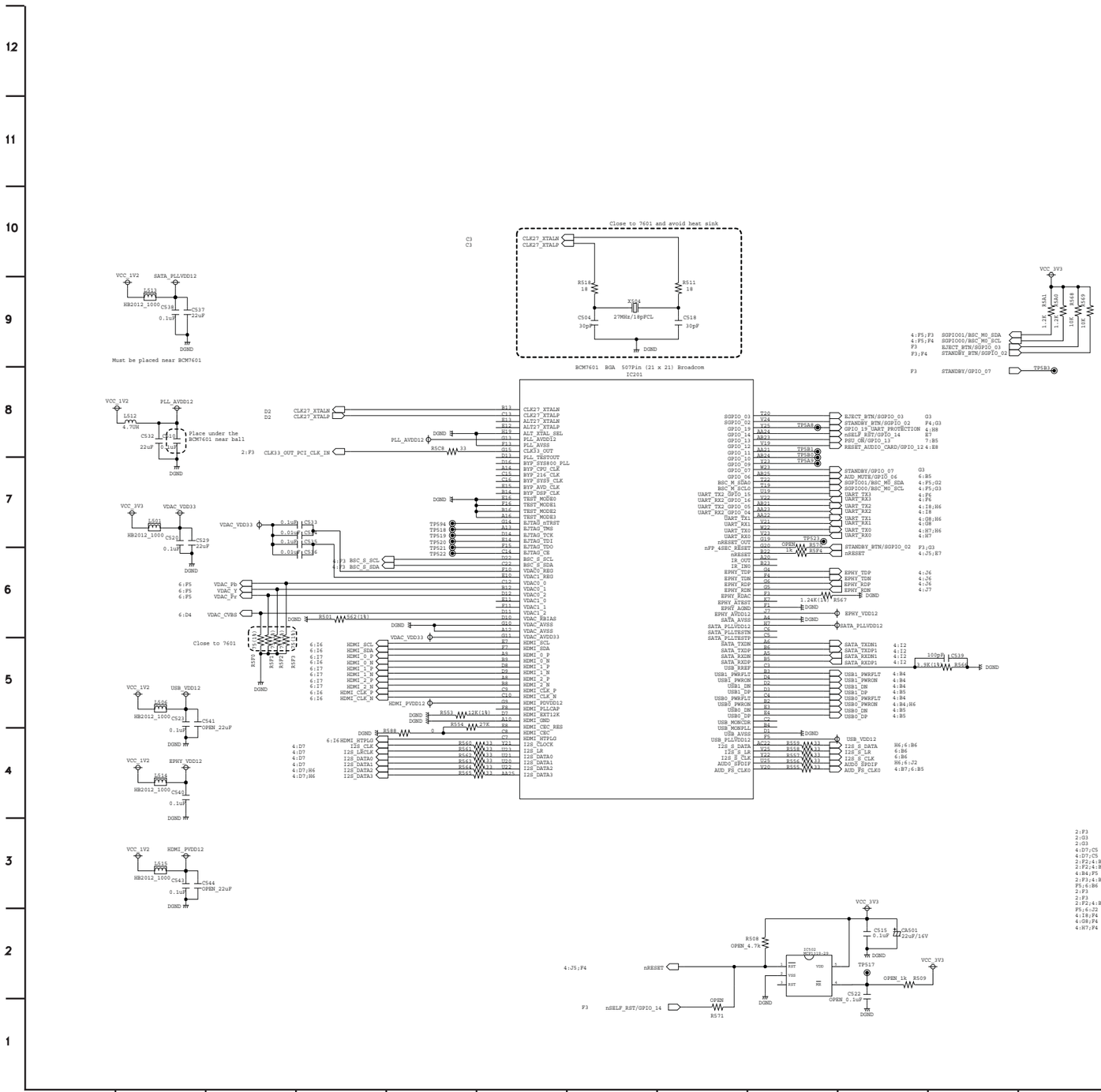
5. BCM7601-1 CIRCUIT DIAGRAM



BCM7601 STRAP OPTIONS

Value	Field Name	Signal	bit	Description
1	Strap_use_defaults	EBI_nRW	31	0:All straps must be set on board 1:Only non-default values need be set
1	strap_reset_outb_def_value	internal(Hard coded)	30	Default value of the nRESET_OUT pin after hardware reset After hardware reset, the nRESET_OUT will change to 1(deasserted)
0 0	strap_test_debug_en_1 strap_test_debug_en_0	EBI_addr24 EBI_addr25	29 28	Test debug mode select Security related(2 bits)? default=0
0	Reserved	N/A	27	Reserved bit must be written with 0. A read returns an unknown value
0	strap_33_27_mhz_clock	internal(Hard coded)	26	33MHz clock is used
0	Reserved	N/A	25	Reserved bit must be written with 0. A read returns an unknown value
0	strap_xtal_sel	Refer to pin ALT_XTAL_SEL	24	XTAL select
0 0 0 0	strap_xtal_adj_3 strap_xtal_adj_2 strap_xtal_adj_1 strap_xtal_adj_0	I2S_DATA2 I2S_DATA3	23 22 21 20	XTAL adjustment
1 0	strap_ebi_rom_size_1 strap_ebi_rom_size_0	NAND_nRE NAND_CLE	19 18	NOR ROM(always 64MB window): NAND ROM: 0=NOR flash 0=disable ECC 1=OneNAND flash 1=1 bit ECC 2=reserved 2=4 bit ECC 3=reserved 3=8 bit ECC
0	strap_ebi_invert_addr	USB0_PWRON	17	0=Do not invert EBI address 1=invert upper bits of EBI address(not used by NAND flash)
0 0	Reserved Reserved	N/A N/A	16 15	Reserved bit must be written with 0. A read returns an unknown value
0	strap_pci_ext_arb	internal(Hard coded)	14	internal Arb.(default)
0	strap_flash_width	EBI_nWE0	13	NOR ROM: NAND ROM: 0=8bit 0=allow writes to block 0 1=16bit 1=ignor write commands to block 0(disallow writes)
0	strap_system_big_endian	I2S_S_DATA	12	0:system is LITTLE endian 1:system is BIG endian
0	strap_ebi_cs_swap	internal(Hard coded)	11	0=no swap 1=swap cs_0 and cs_1
1	strap_nand_flash	EBI_nWE1	10	0=Boot from NOR 1=Boot from NAND
0	strap_spi_slave_enable	PCI_nGNT0	9	0=The slave serial port(SSP) uses BSC protocol 1=The SSP uses SPI protocol
0 1	strap_pci_memwin_size_1 strap_pci_memwin_size_0	internal(Hard coded) internal(Hard coded)	8 7	1024MB
0 0	strap_pci_memwin2_en strap_pci_memwin1_en	internal(Hard coded) internal(Hard coded)	6 5	PCI memory window 2 is disabled PCI memory window 1 is enabled
0	strap_pci_client	NAND_ALE	4	0=Chip is a PCI master device 1=Chip operates as a PCI slave device
0 0 0	Reserved Reserved Reserved	N/A N/A N/A	3 2 1	Reserved bit must be written with 0. A read returns an unknown value
1	strap_reset_ext_mode	AUD0_SPDIF	0	0=nRESET_OUT is not extended 1=nRESET_OUT is extended 200ms

2009.2.16

5. BCM7601-1

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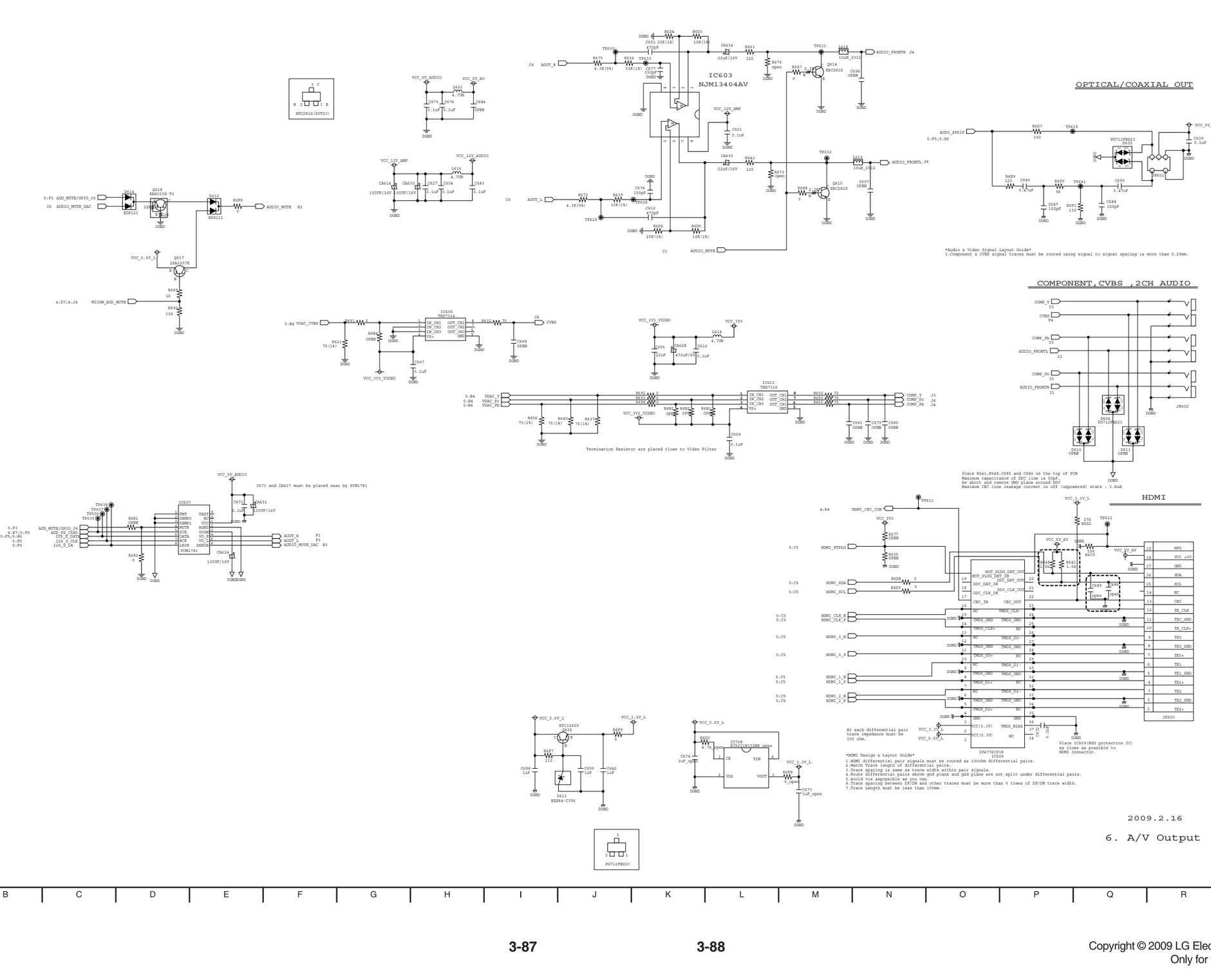
6. A/V OUTPUT CIRCUIT DIAGRAM



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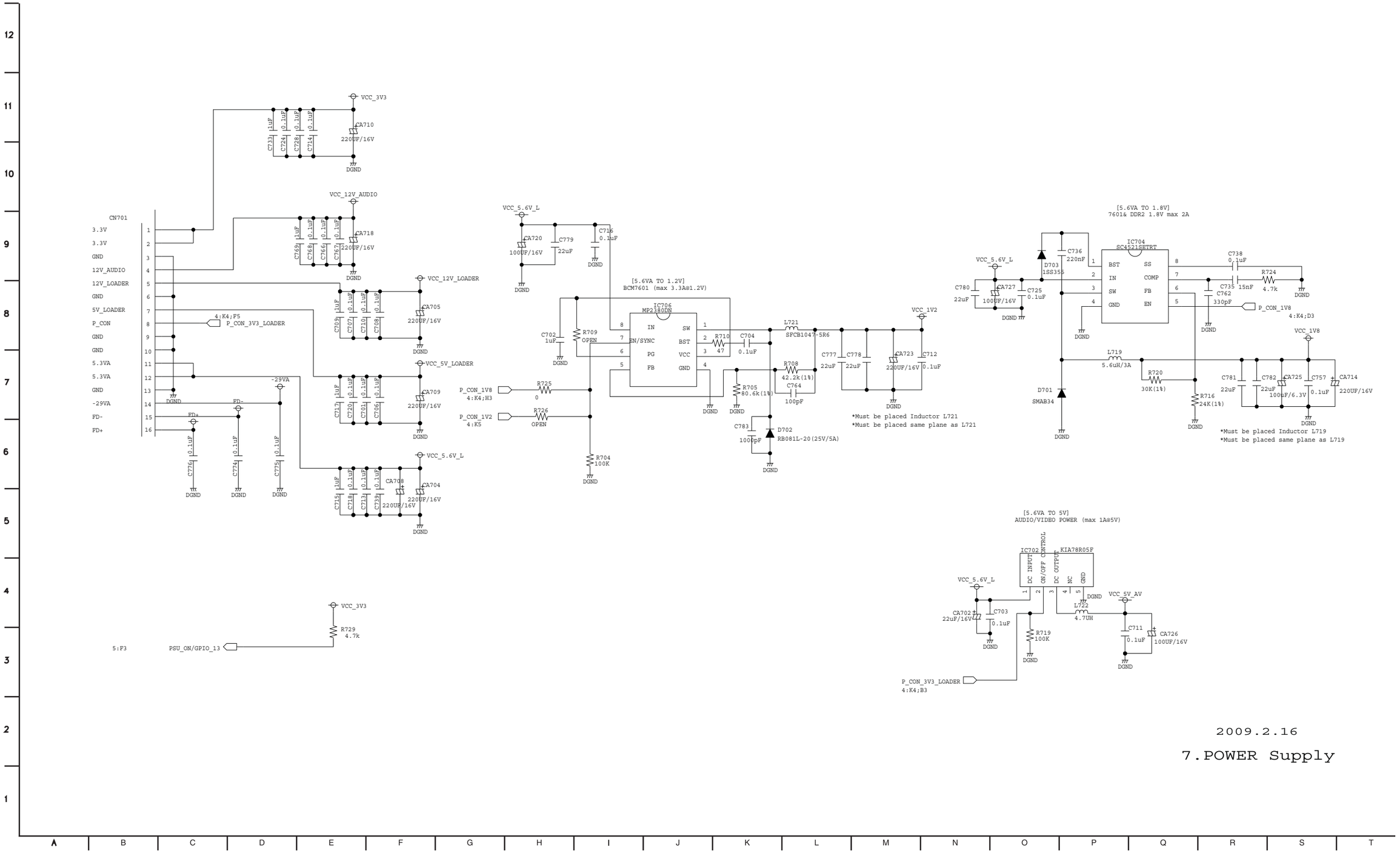
7. POWER SUPPLY CIRCUIT DIAGRAM



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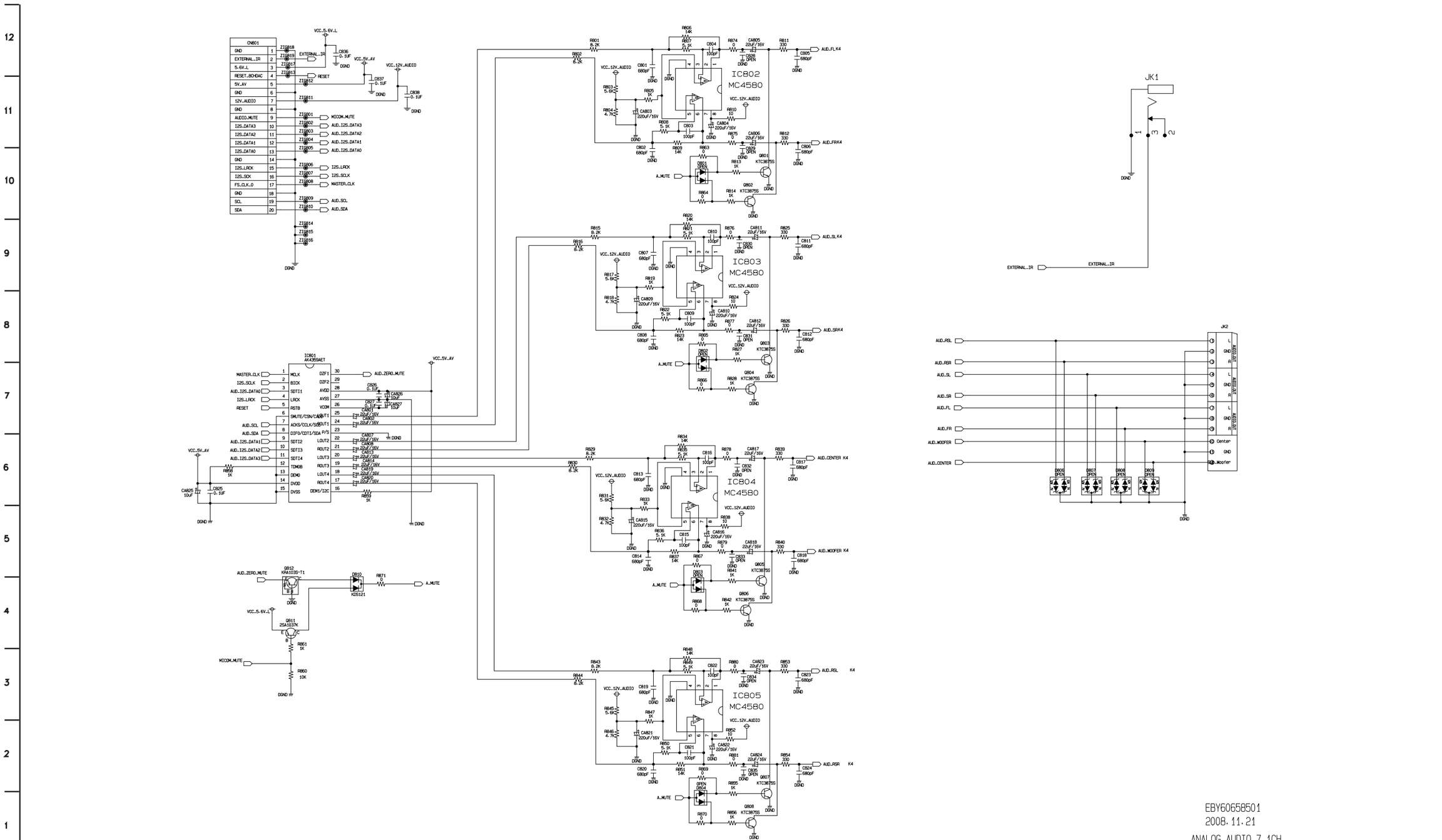
8. ANALOG AUDIO 7.1CH. CIRCUIT DIAGRAM



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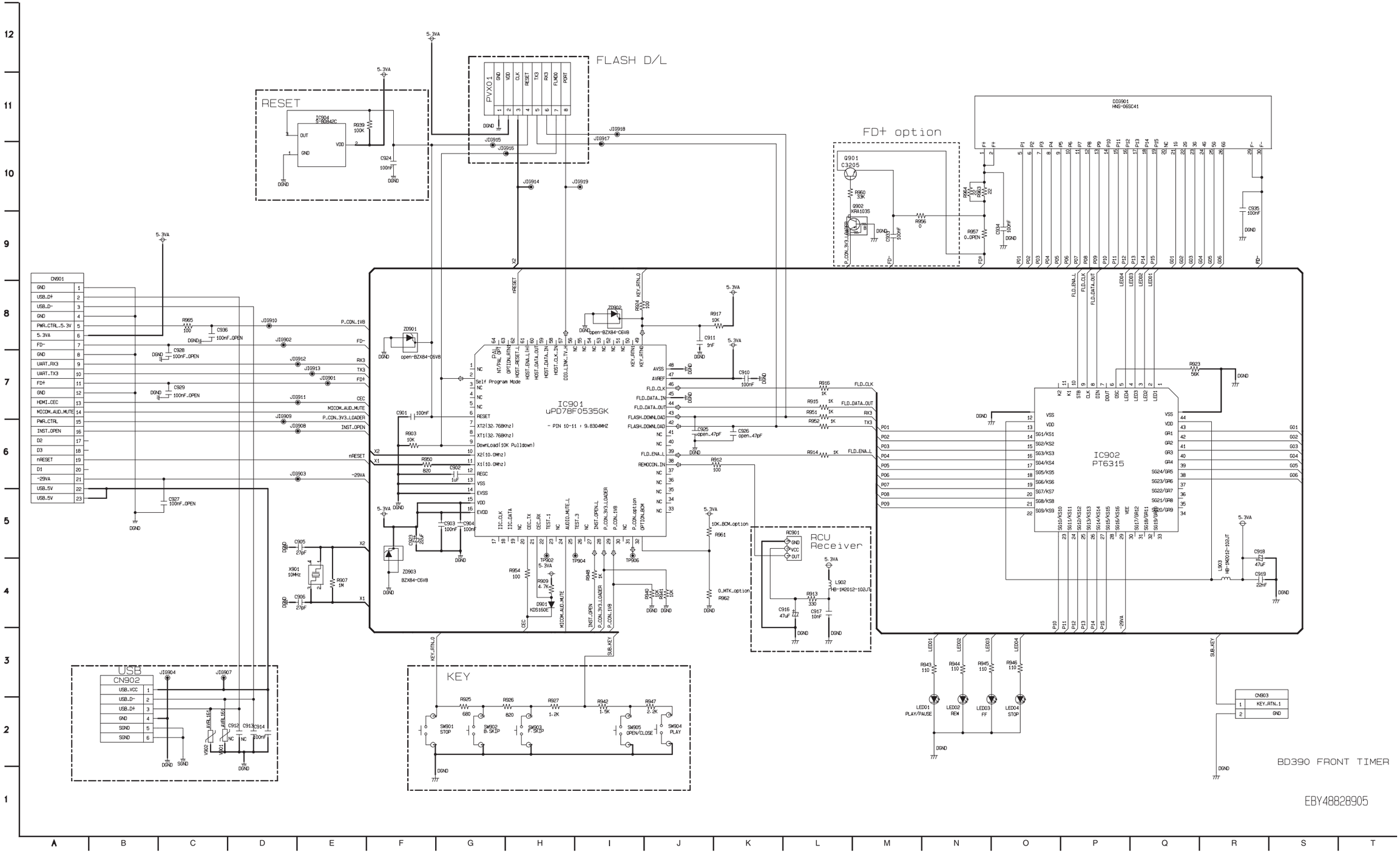
9. FRONT TIMER CIRCUIT DIAGRAM



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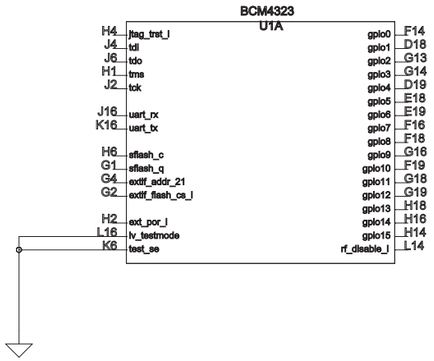
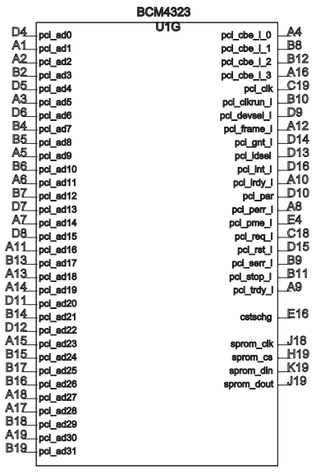
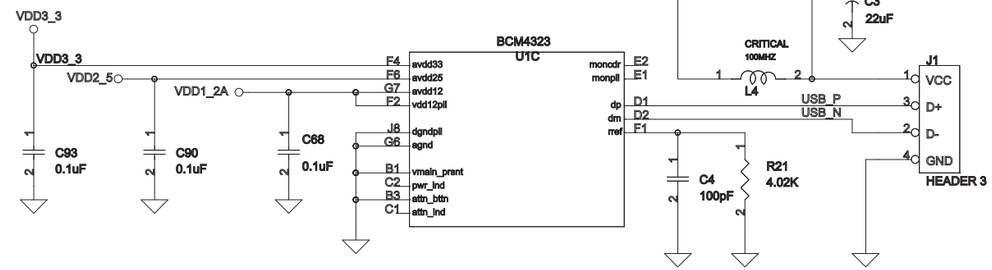
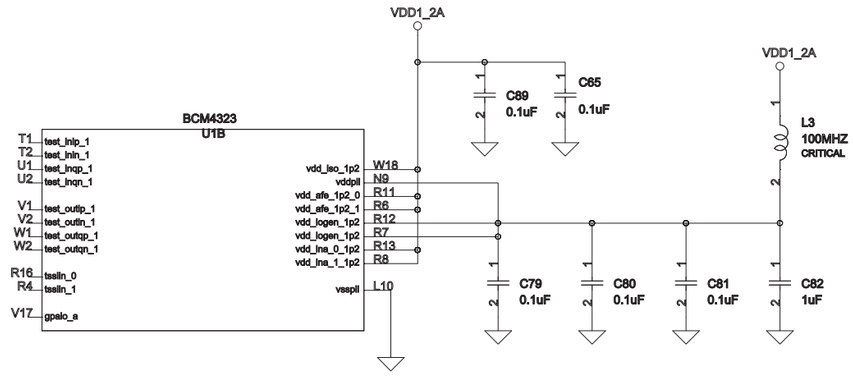
10. USB, GPIO, STRAP CIRCUIT DIAGRAM









Pin name	Netname	Status
mimophy_core1_ant2_swctrl_1	VRXA1_1	ext PD
mimophy_core1_ant1_swctrl_1	VRXA0_1	ext PU
mimophy_pa_cntrl_2g_1	PA_cntrl_2G_1	ext PU
mimophy_core0_ant1_swctrl_1	VRXA0_0	ext PU
mimophy_ext_lna_2g_pu_0	xlna_cntl_2g_pu0	ext PU
mimophy_core1_ant1_swctrl_2	VTXA0_1	ext PU

USB Interface/GPIOs/strap

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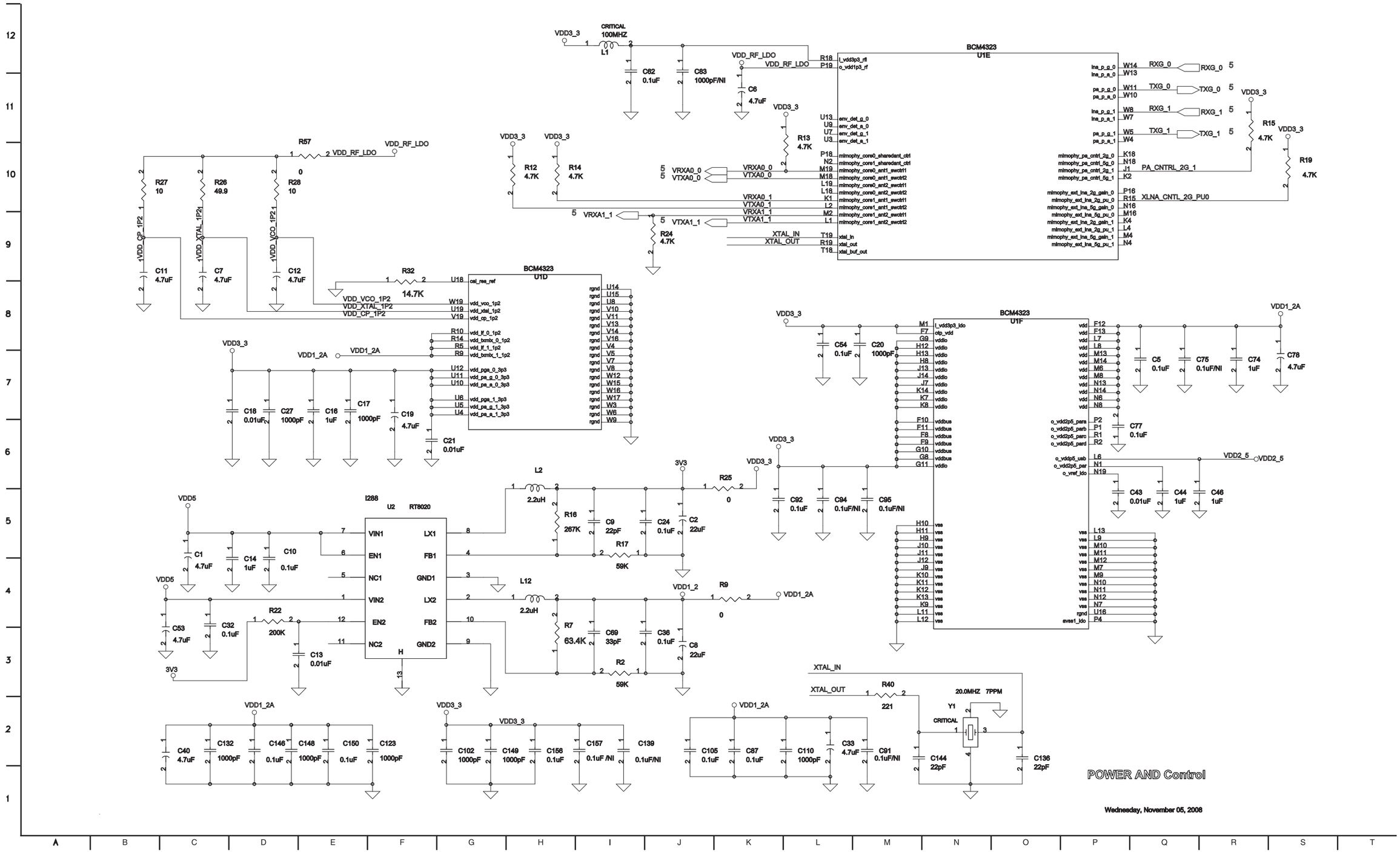
11. POWER AND CONTROL CIRCUIT DIAGRAM



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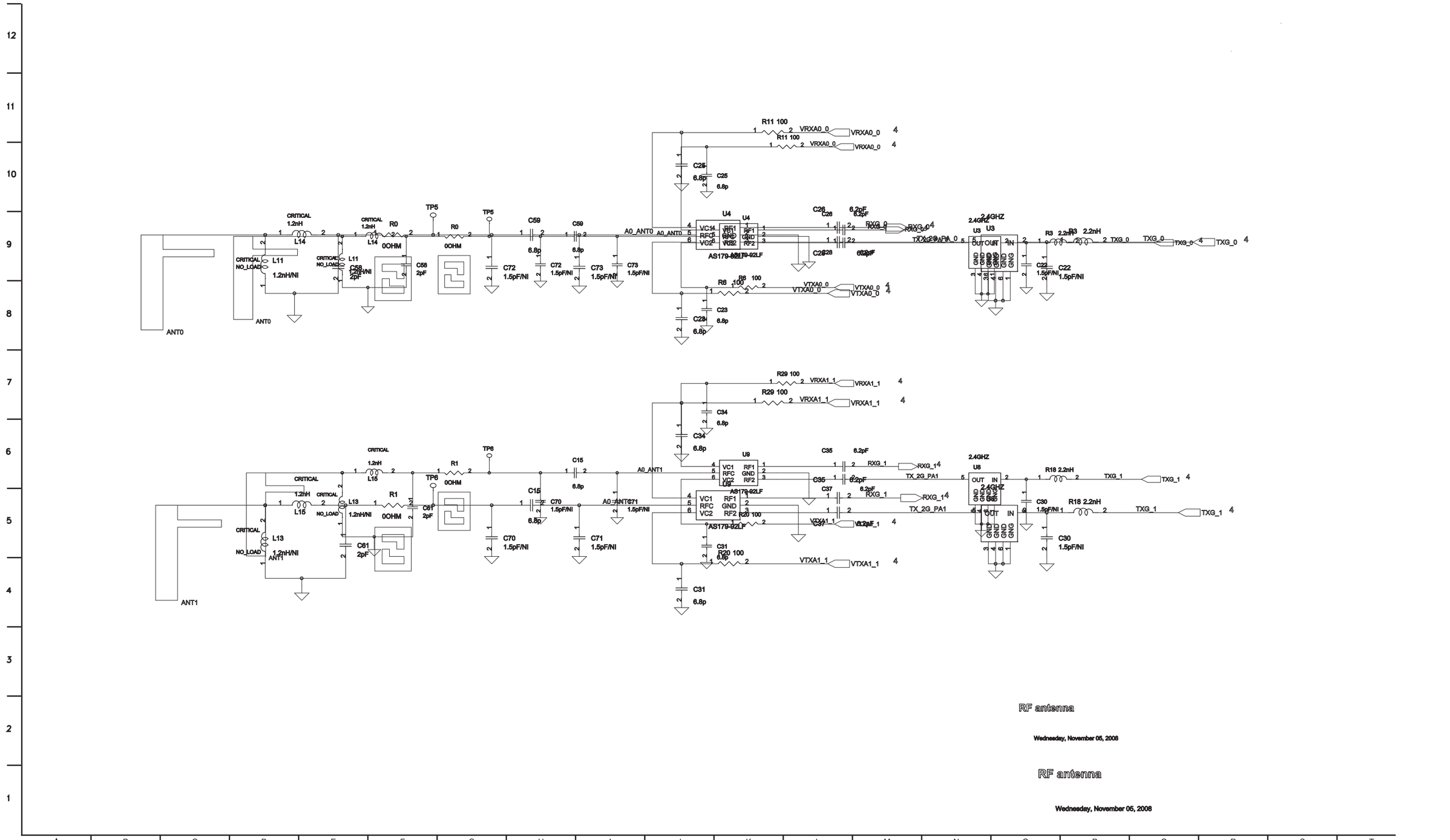
12. RF ANTENNA CIRCUIT DIAGRAM



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CIRCUIT VOLTAGE CHART

1. MAIN BOARD ICs (VOLT)

PIN	IC402		IC609		IC603		IC610		IC606		IC702		IC704		IC706	
	STOP	PLAY	STOP	PLAY	STOP	PLAY	STOP	PLAY	STOP	PLAY	STOP	PLAY	STOP	PLAY	STOP	PLAY
1	0.00	0.00	5.30	5.30	3.60	3.60	0.00	0.00	0.00	0.00	5.30	5.30	6.78	6.78	1.27	1.27
2	0.00	0.00	3.30	3.30	2.40	2.40	0.00	0.00	0.00	0.00	5.20	5.20	5.30	5.30	5.90	5.90
3	0.00	0.00	0.00	0.00	2.40	2.40	0.00	0.00	0.00	0.00	5.00	5.00	1.86	1.86	5.00	5.00
4	3.30	3.30	3.00	3.00	0.00	0.00	3.30	3.30	3.30	3.30	0.00	0.00	0.00	0.00	0.00	0.00
5	3.30	3.30	0.00	0.00	2.40	2.40	0.00	0.00	0.00	0.00	0.00	0.00	5.30	5.30	0.78	0.78
6	3.30	3.30	3.00	3.00	2.40	2.40	1.00	1.00	0.00	0.00			0.80	0.80	0.00	0.00
7	3.30	3.30	3.00	3.00	3.60	3.60	1.00	1.00	0.00	0.00			1.30	1.30	5.25	5.25
8	3.30	3.30	0.00	0.00	12.00	12.00	1.30	1.30	1.20	1.20			1.70	1.70	5.30	5.30
9	3.30	3.30	3.00	3.00												
10	3.30	3.30	3.00	3.00												
11	0.00	0.00	0.00	0.00												
12	3.30	3.30	3.00	3.00												
13	0.00	0.00	3.00	3.00												
14	0.00	0.00	0.00	0.00												
15	0.00	0.00	3.00	3.00												
16	3.30	3.30	5.00	5.00												
17	3.30	3.30	0.00	0.00												
18	3.30	3.30	0.00	0.00												
19	3.30	3.30	3.23	3.23												
20	0.00	0.00	3.13	3.13												
21	0.00	0.00	0.00	0.00												
22	0.00	0.00	0.00	0.00												
23	0.00	0.00	0.00	0.00												
24	0.00	0.00	3.00	3.00												
25	0.00	0.00	0.00	0.00												
26	0.00	0.00	3.00	3.00												
27	0.00	0.00	3.00	3.00												
28	0.00	0.00	0.00	0.00												
29	3.30	3.30	3.00	3.00												
30	3.30	3.30	3.00	3.00												
31	3.30	3.30	0.00	0.00												
32	3.30	3.30	3.00	3.00												
33	0.00	0.00	3.00	3.00												
34	0.00	0.00	0.00	0.00												
35	0.00	0.00	3.00	3.00												
36	0.00	0.00	0.00	0.00												
37	3.30	3.30	4.70	4.70												
38	0.00	0.00	0.00	0.00												
39	0.00	0.00														
40	0.00	0.00														
41	3.30	3.30														
42	3.30	3.30														
43	3.30	3.30														
44	3.30	3.30														
45	0.00	0.00														
46	0.00	0.00														
47	0.00	0.00														
48	0.00	0.00														

2. MAIN BOARD Capacitors

NO	LOC	SPEC	PLAYBACK	
			(+)	(-)
1	CA401	22uF/16V	3.29	0.00
2	CA404	22uF/16V	5.09	0.00
3	CA407	22uF/16V	2.54	0.00
4	CA702	22uF/16V	5.29	0.00
5	CA2E1	47uF/16V	1.81	0.00
6	CA2E2	47uF/16V	3.29	0.00
7	CA2E3	47uF/16V	1.23	0.00
8	CA2E4	47uF/16V	2.54	0.00
9	CA2E5	47uF/16V	1.23	0.00
10	CA2E6	47uF/16V	1.81	0.00
11	CA2E7	47uF/16V	3.29	0.00
12	CA410	100uF/6.3V	3.29	0.00
13	CA725	100uF/6.3V	1.81	0.00
14	CA415	100uF/16V	5.00	0.00
15	CA416	100uF/16V	12.00	0.00
16	CA417	100uF/16V	5.00	0.00
17	CA614	100uF/16V	12.05	0.00
18	CA624	100uF/16V	2.54	0.00
19	CA630	100uF/16V	12.05	0.00
20	CA631	100uF/16V	5.09	0.00
21	CA634	22uF/16V	3.60	0.00
22	CA635	22uF/16V	3.60	0.00
23	CA720	100uF/16V	5.28	0.00
24	CA726	100uF/16V	5.09	0.00
25	CA727	100uF/16V	5.27	0.00
26	CA628	470uF/6.3V	3.28	0.00
27	CA345	220uF/16V	1.81	0.00
28	CA346	220uF/16V	1.81	0.00
29	CA347	220uF/16V	1.81	0.00
30	CA348	220uF/16V	1.81	0.00
31	CA704	220uF/16V	5.32	0.00
32	CA705	220uF/16V	12.20	0.00
33	CA708	220uF/16V	5.32	0.00
34	CA709	220uF/16V	4.98	0.00
35	CA710	220uF/16V	3.30	0.00
36	CA714	220uF/16V	1.81	0.00
37	CA718	220uF/16V	12.20	0.00
38	CA723	220uF/16V	1.23	0.00
39	CA501	22uF/16V	3.30	0.00

3. 7.1CH BOARD Capacitors

NO	LOC	SPEC	PLAYBACK	
			(+)	(-)
1	CA825	10uF/16V	5.08	0.00
2	CA826	10uF/16V	5.08	0.00
3	CA827	10uF/16V	2.52	0.00
4	CA803	220uF/16V	5.49	0.00
5	CA804	220uF/16V	12.00	0.00
6	CA805	22uF/16V	5.53	0.00
7	CA806	22uF/16V	5.53	0.00
8	CA809	220uF/16V	5.5	0.00
9	CA810	220uF/16V	12.00	0.00
10	CA811	22uF/16V	5.53	0.00
11	CA812	22uF/16V	5.53	0.00
12	CA815	220uF/16V	5.53	0.00
13	CA816	220uF/16V	12.00	0.00
14	CA817	22uF/16V	5.53	0.00
15	CA818	22uF/16V	5.53	0.00
16	CA821	220uF/16V	5.47	0.00
17	CA822	220uF/16V	12.00	0.00
18	CA823	22uF/16V	5.53	0.00
19	CA824	22uF/16V	5.53	0.00
20	CA801	22UF/16V	5.50	2.50
21	CA802	22UF/16V	5.50	2.50
22	CA807	22UF/16V	5.50	2.50
23	CA808	22UF/16V	5.50	2.50
24	CA813	22UF/16V	5.50	2.50
25	CA814	22UF/16V	5.50	2.50
26	CA819	22UF/16V	5.50	2.50
27	CA820	22UF/16V	5.50	2.50

4. FRONT TIMER BOARD

Timer Board	Reference	Capacitors	Play Mode		EE Mode	
			+	-	+	-
	C923	22uF/16V	5.27	0	5.27	0
	C916	47uF/16V	4.88	0	4.88	0
	C918	47uF16/V	5.27	0	5.27	0

IC901- uPD7BF0535GK Micom		
Pin No.	Desc.	Voltage
15	VDD	5.27
47	AVREF	5.27

IC904 S-80842C 4.2V RESET IC		
	Desc.	Voltage
1	VDD	5.26
2	OUT	5.22
3	VSS	0

DIG901 HNS-06SC41		
	Desc.	Voltage
	FD+	-22.4

IC902 - PT6315 VFD Driver IC		
Pin No.	Desc.	Voltage
13, 43	VDD	5.26
30	-29VA	-28.68

RC901 RCU Receiver		
Pin	Desc.	Voltage
2	VCC	4.87

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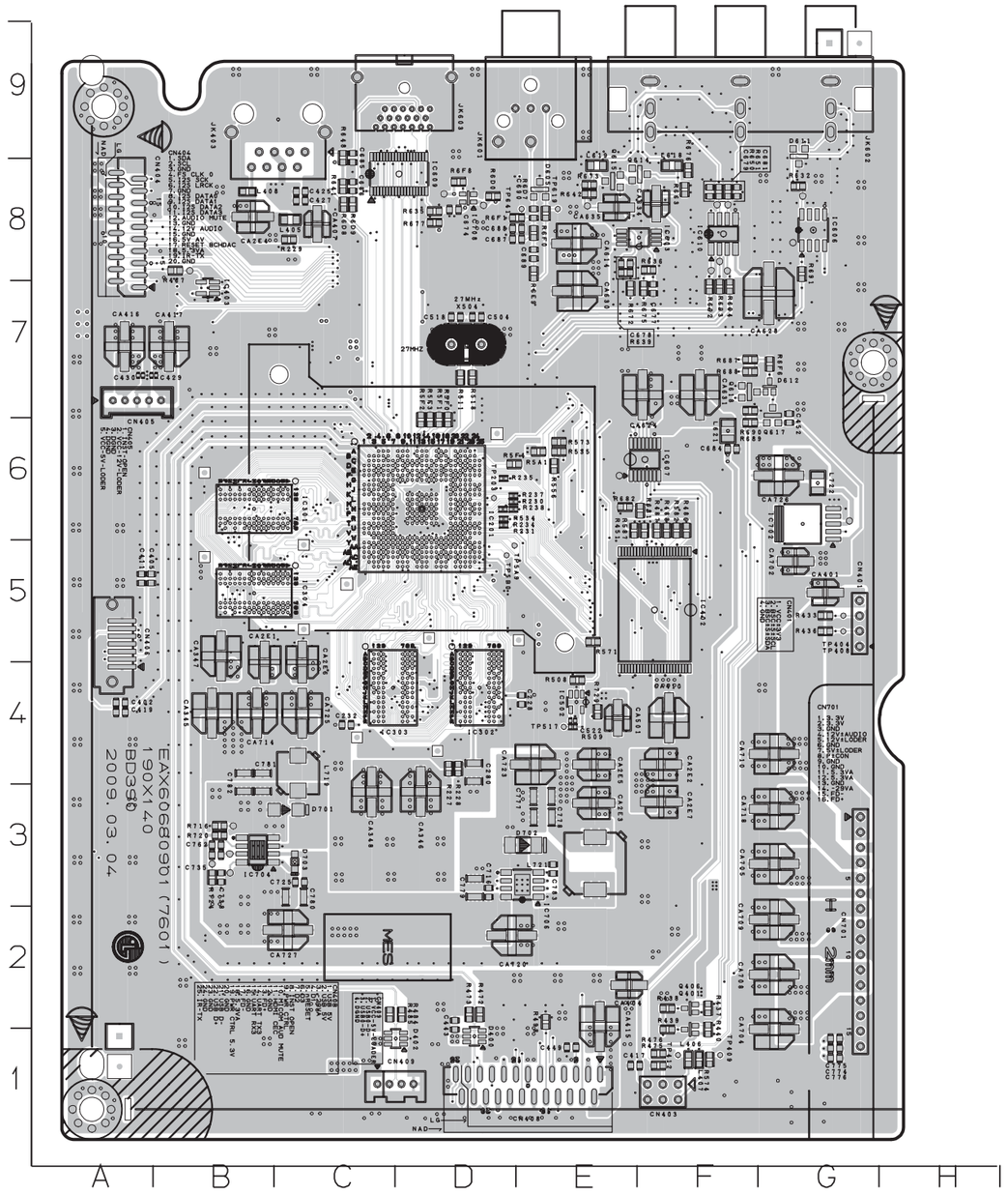
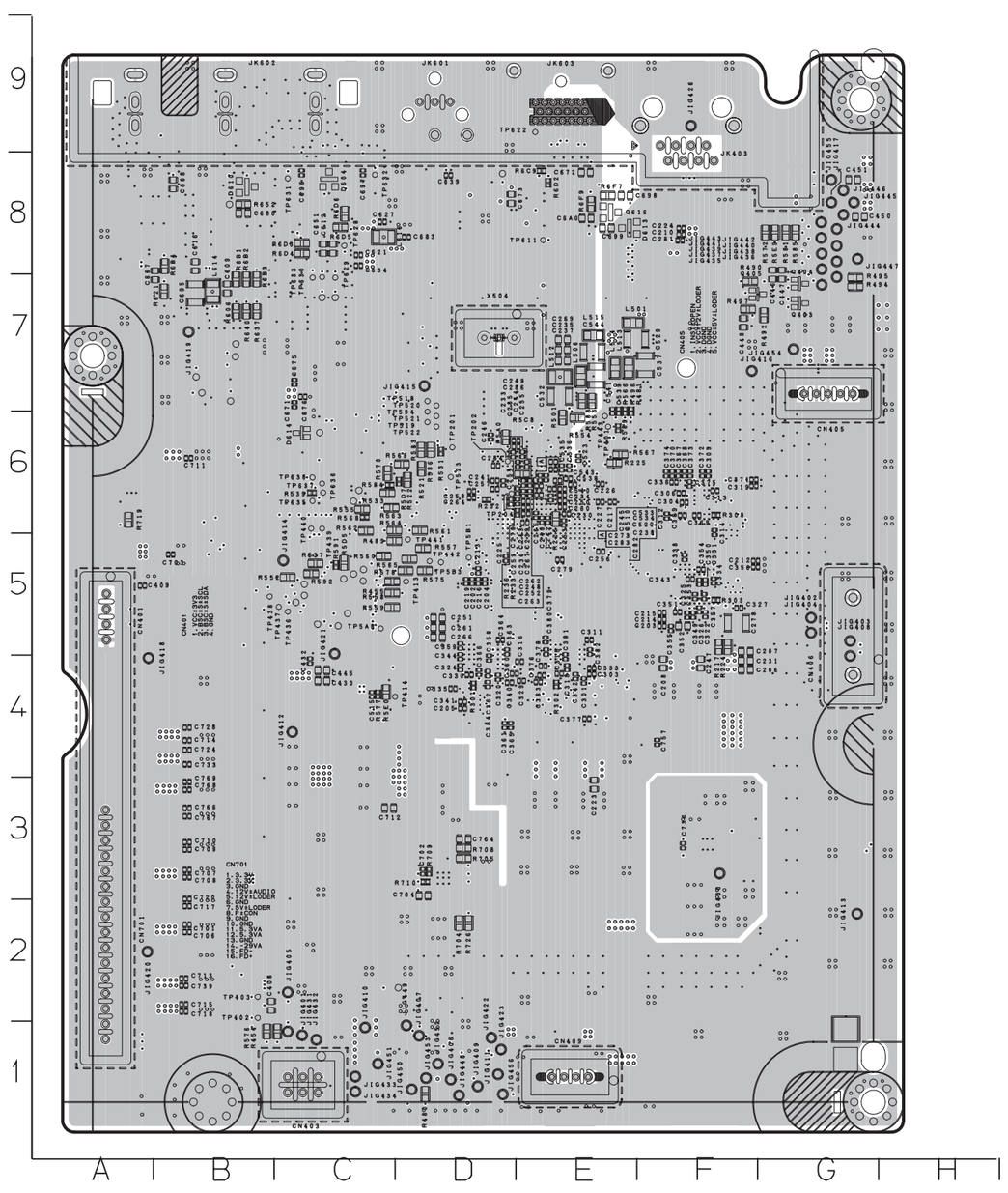
PRINTED CIRCUIT BOARD DIAGRAMS

1. MAIN P.C.BOARD

(TOP VIEW)



(BOTTOM VIEW)



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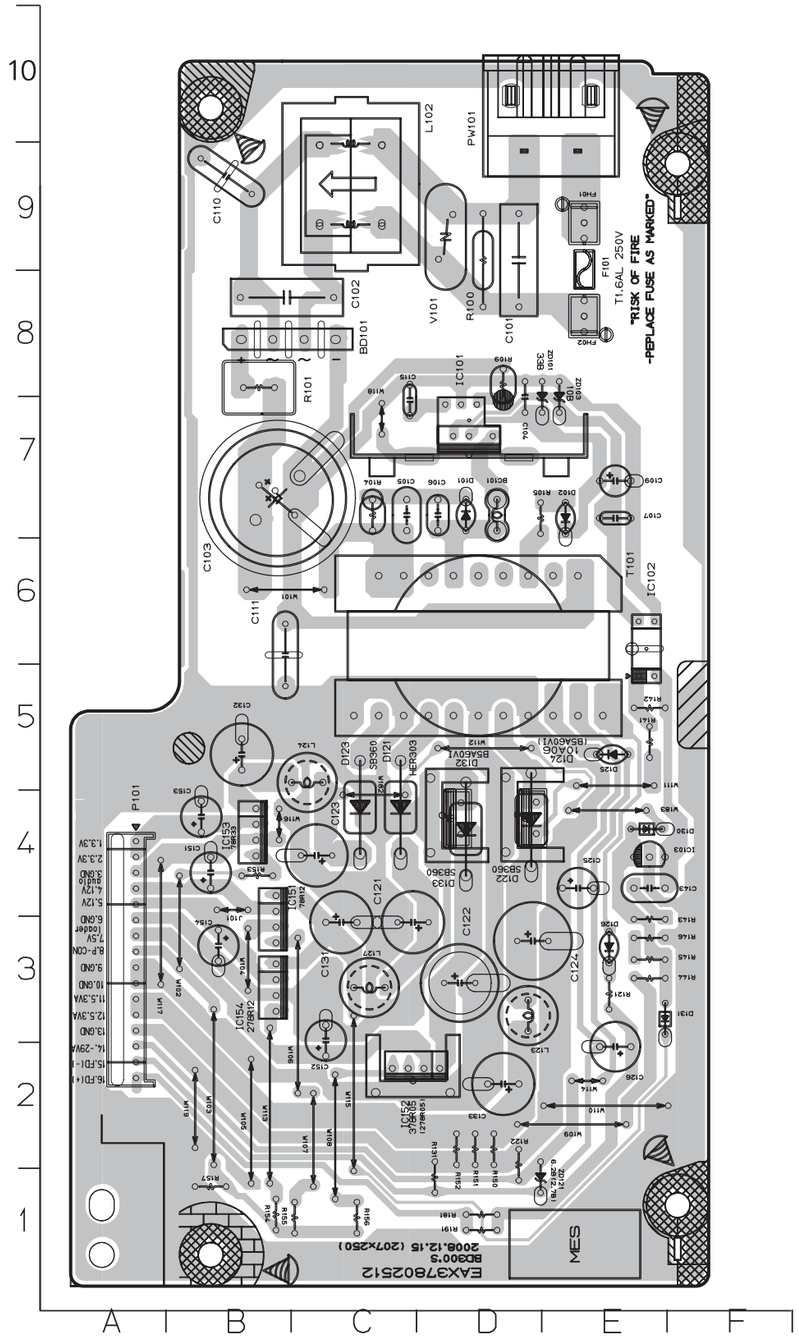
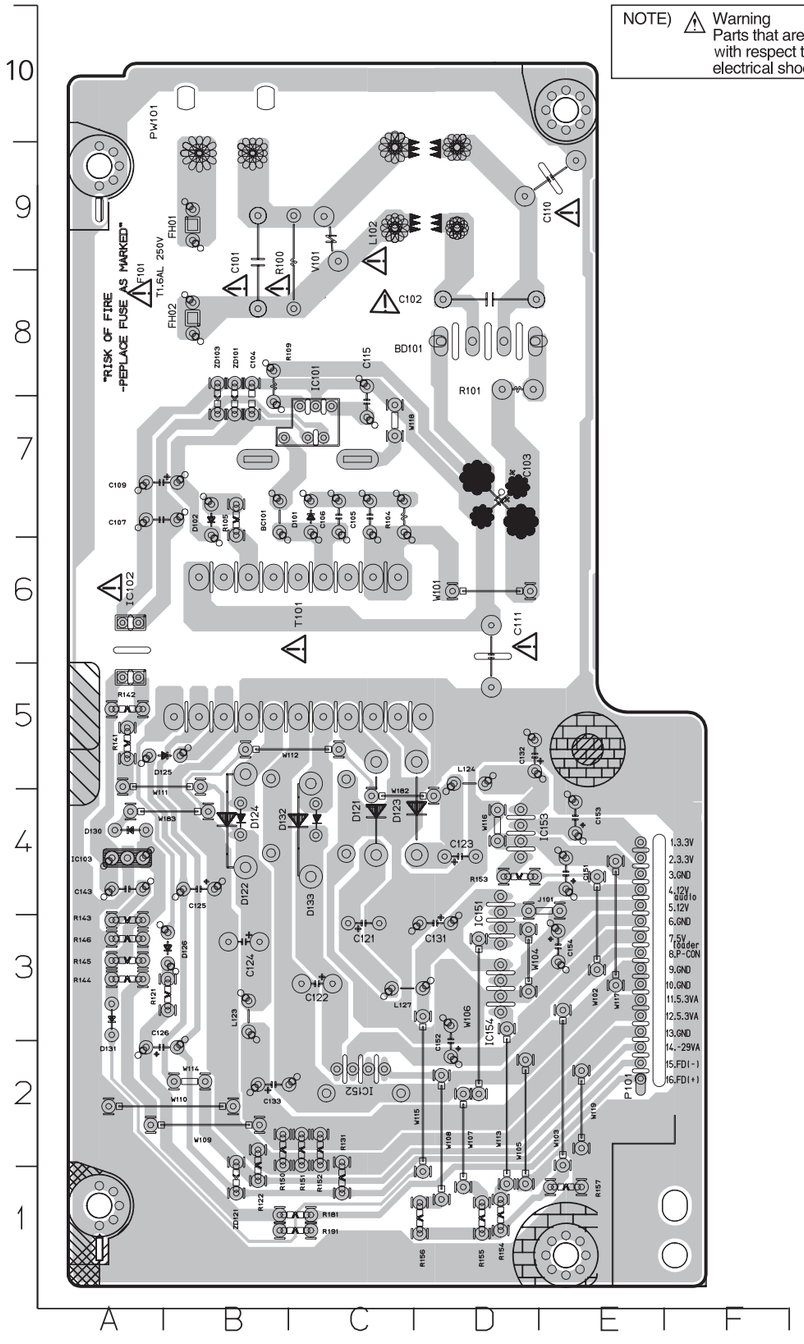
2. SMPS P.C.BOARD

(TOP VIEW)



(BOTTOM VIEW)

NOTE) ⚠ Warning
Parts that are shaded are critical with respect to risk of fire or electrical shock.



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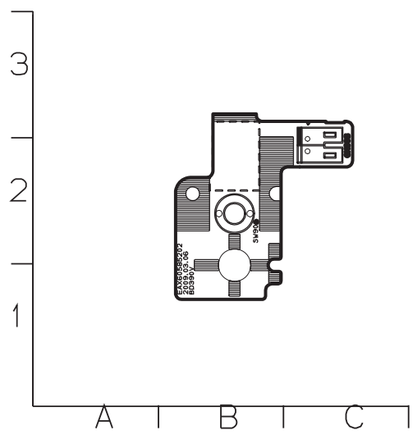
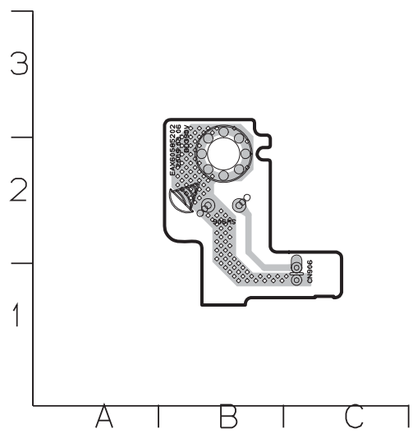
3. POWER KEY P.C.BOARD

(TOP VIEW)

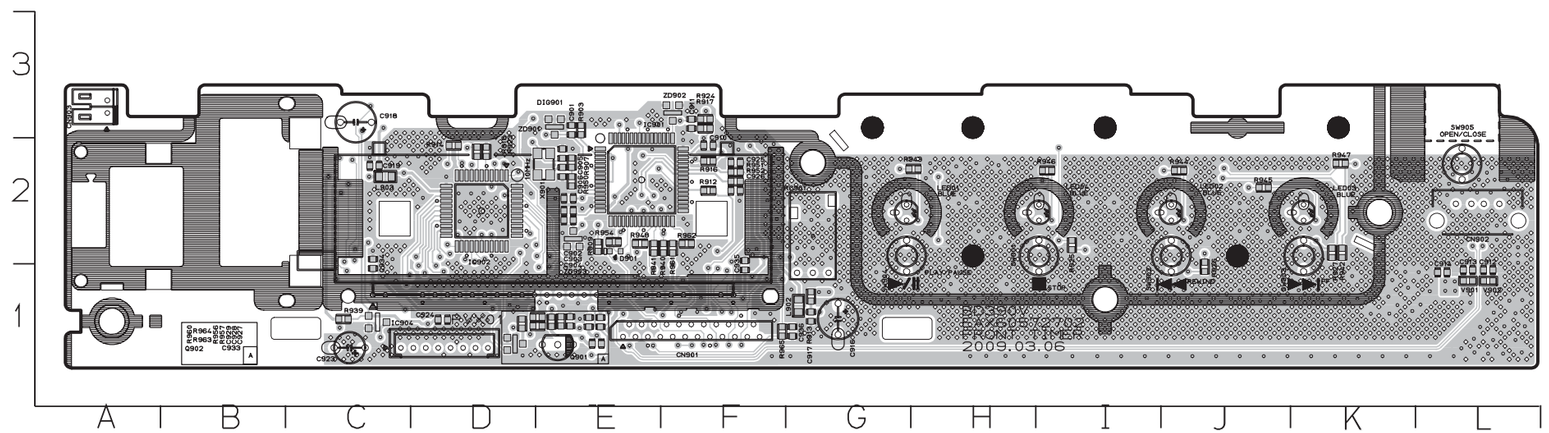


(BOTTOM VIEW)

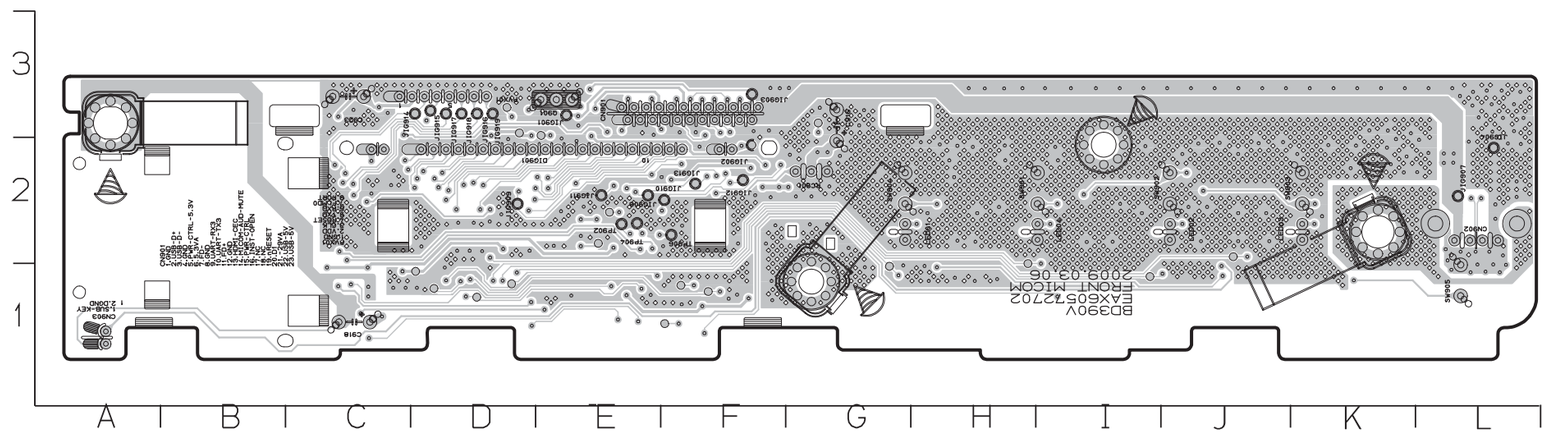


4. FRONT TIMER P.C.BOARD

(TOP VIEW)



(BOTTOM VIEW)



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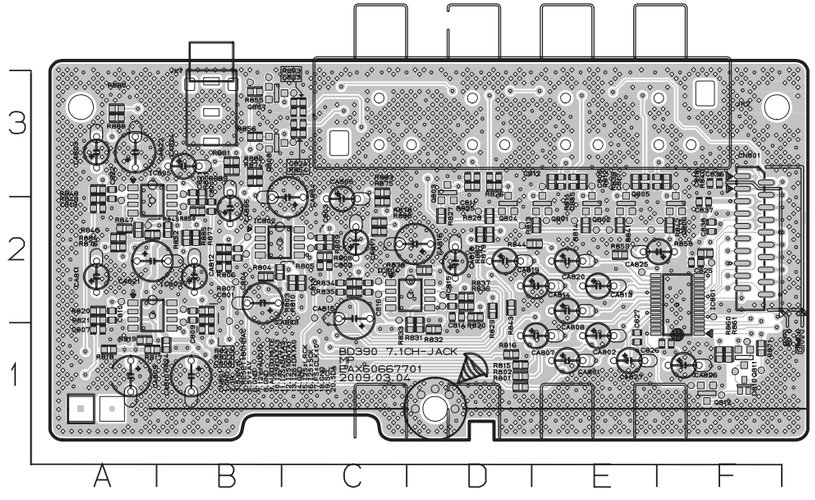
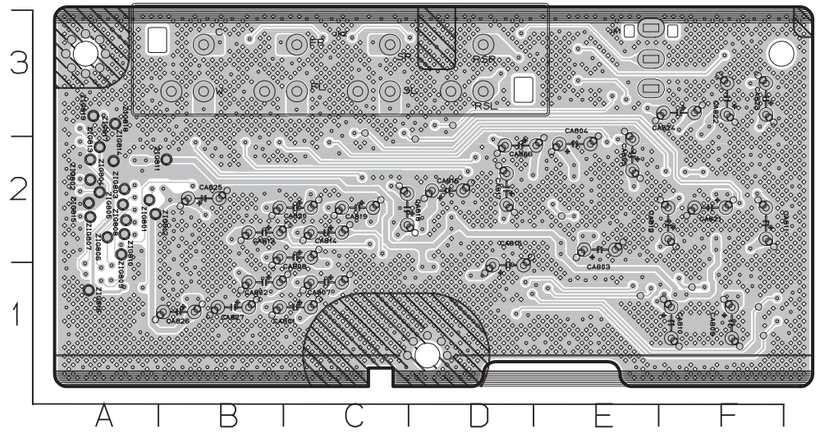
5. ANALOG 7.1CH P.C.BOARD

(TOP VIEW)

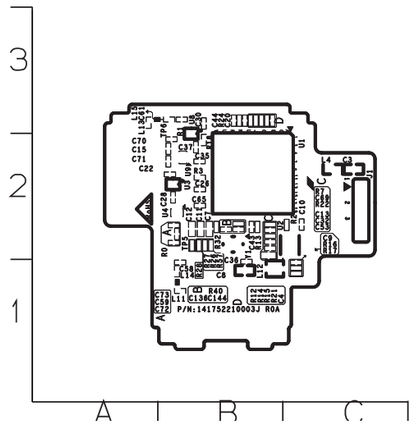


(BOTTOM VIEW)

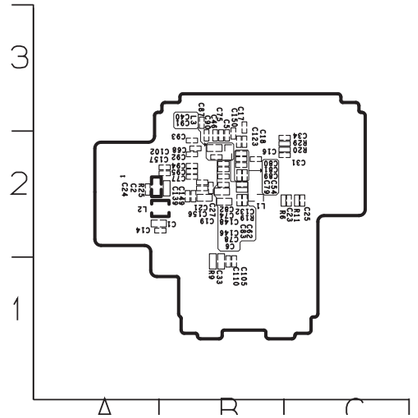


6. WI-FI P.C.BOARD

(TOP VIEW)



(BOTTOM VIEW)



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MEMO

MEMO

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SECTION 4

HL-05P LOADER PART

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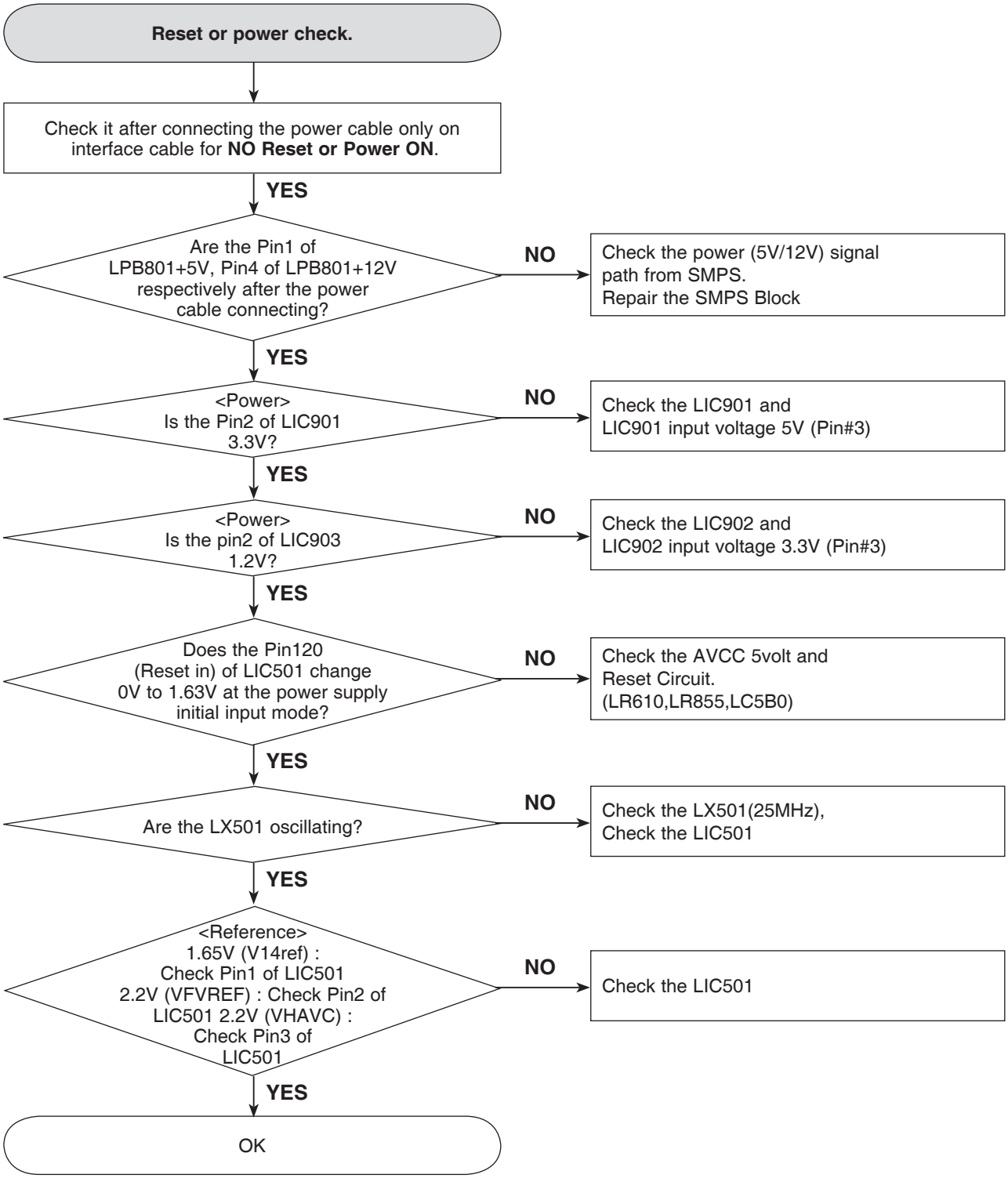
ELECTRICAL TROUBLESHOOTING GUIDE

1. RESET OR POWER CHECK



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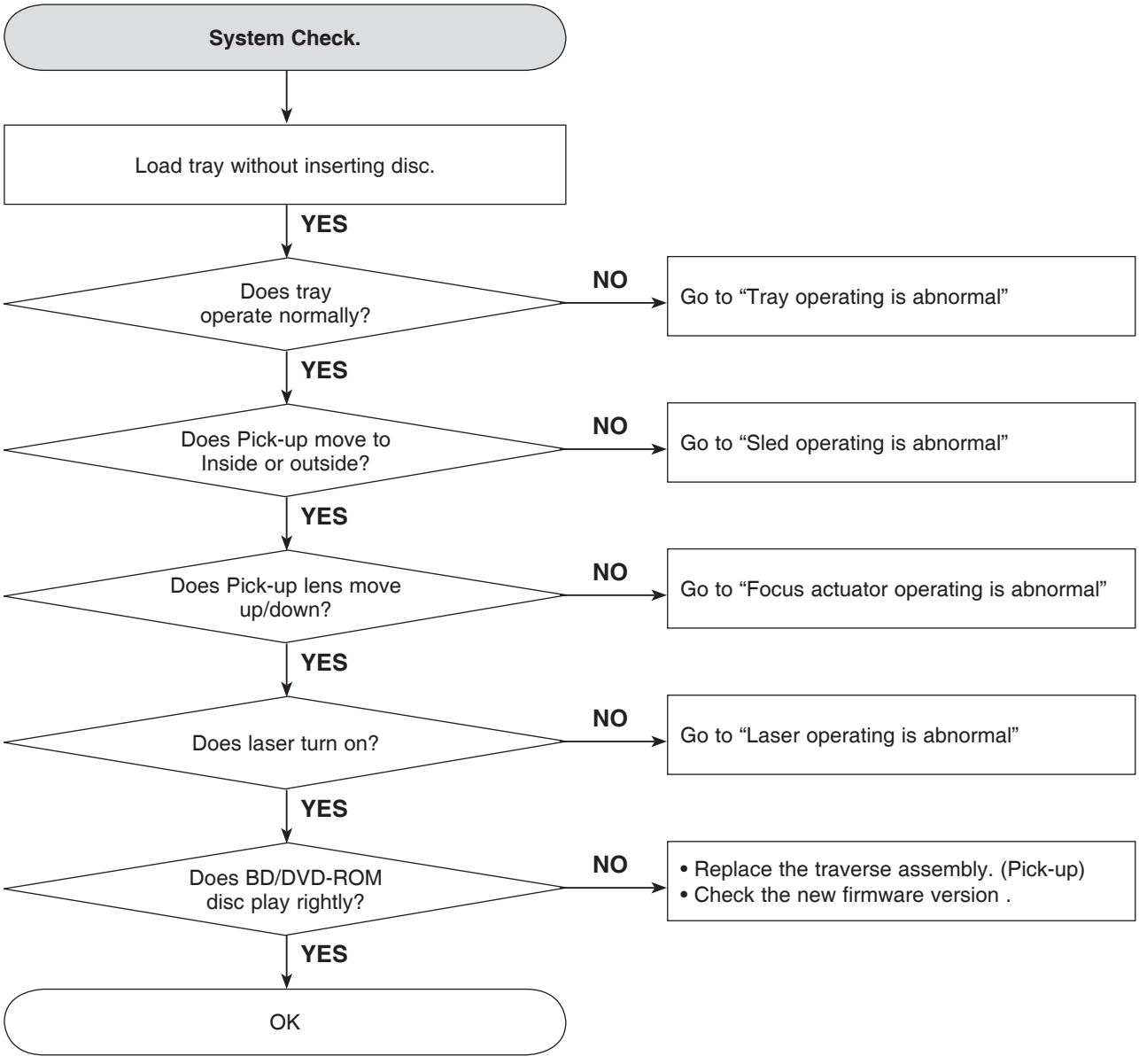
ELECTRICAL TROUBLESHOOTING GUIDE

2. SYSTEM CHECK



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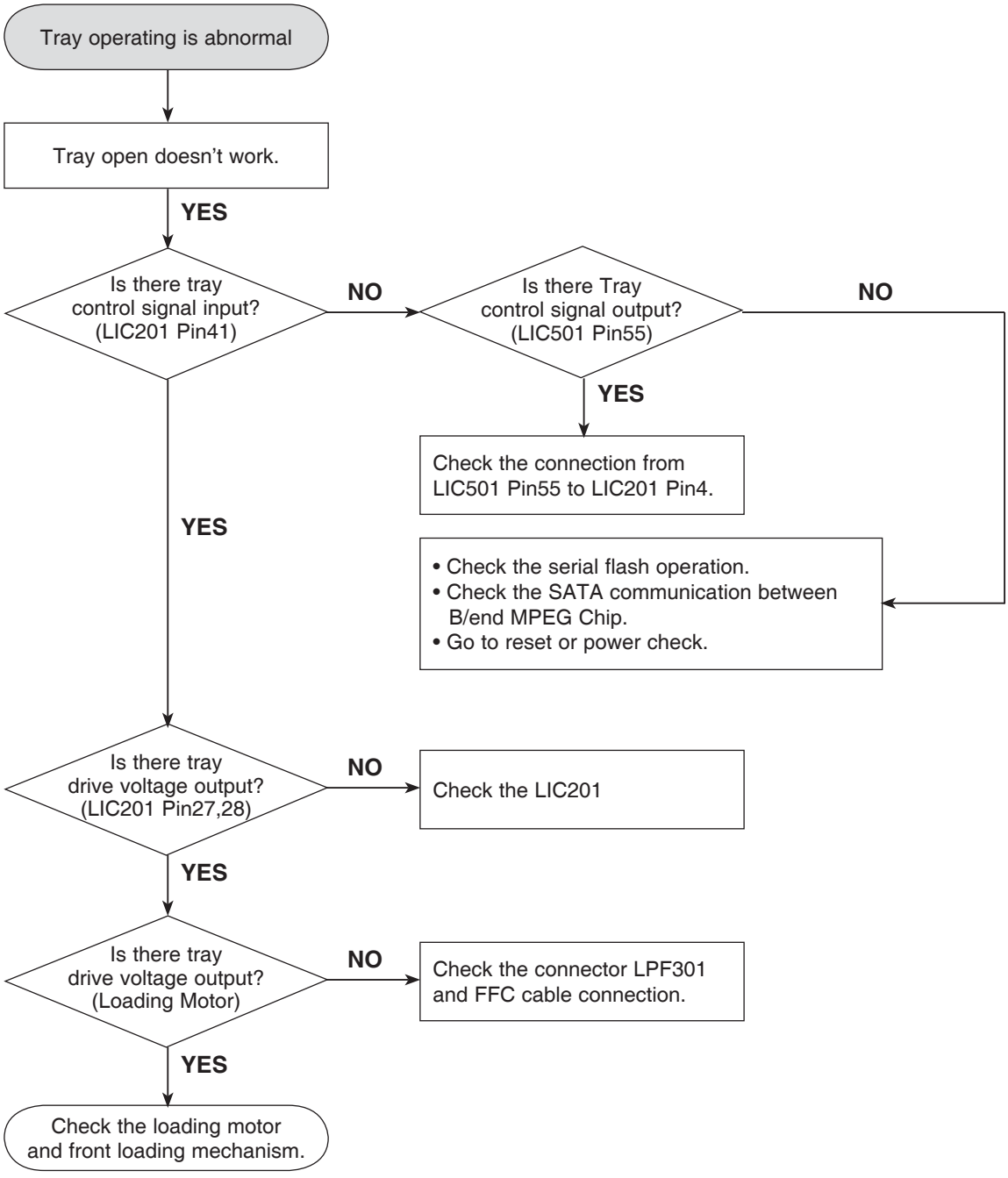
ELECTRICAL TROUBLESHOOTING GUIDE

3. TRAY OPERATING IS ABNORMAL



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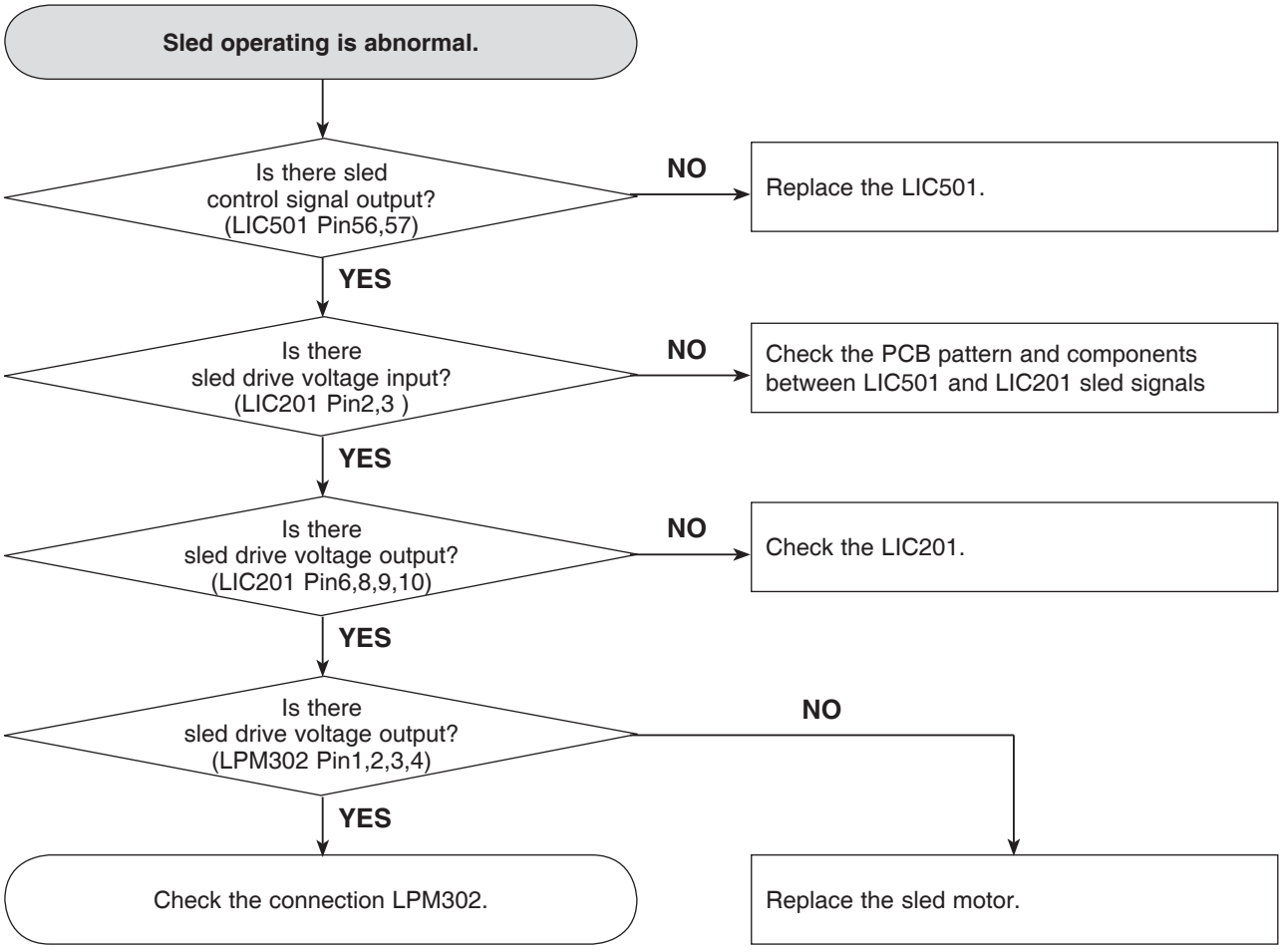
4. SLED OPERATING IS ABNORMAL



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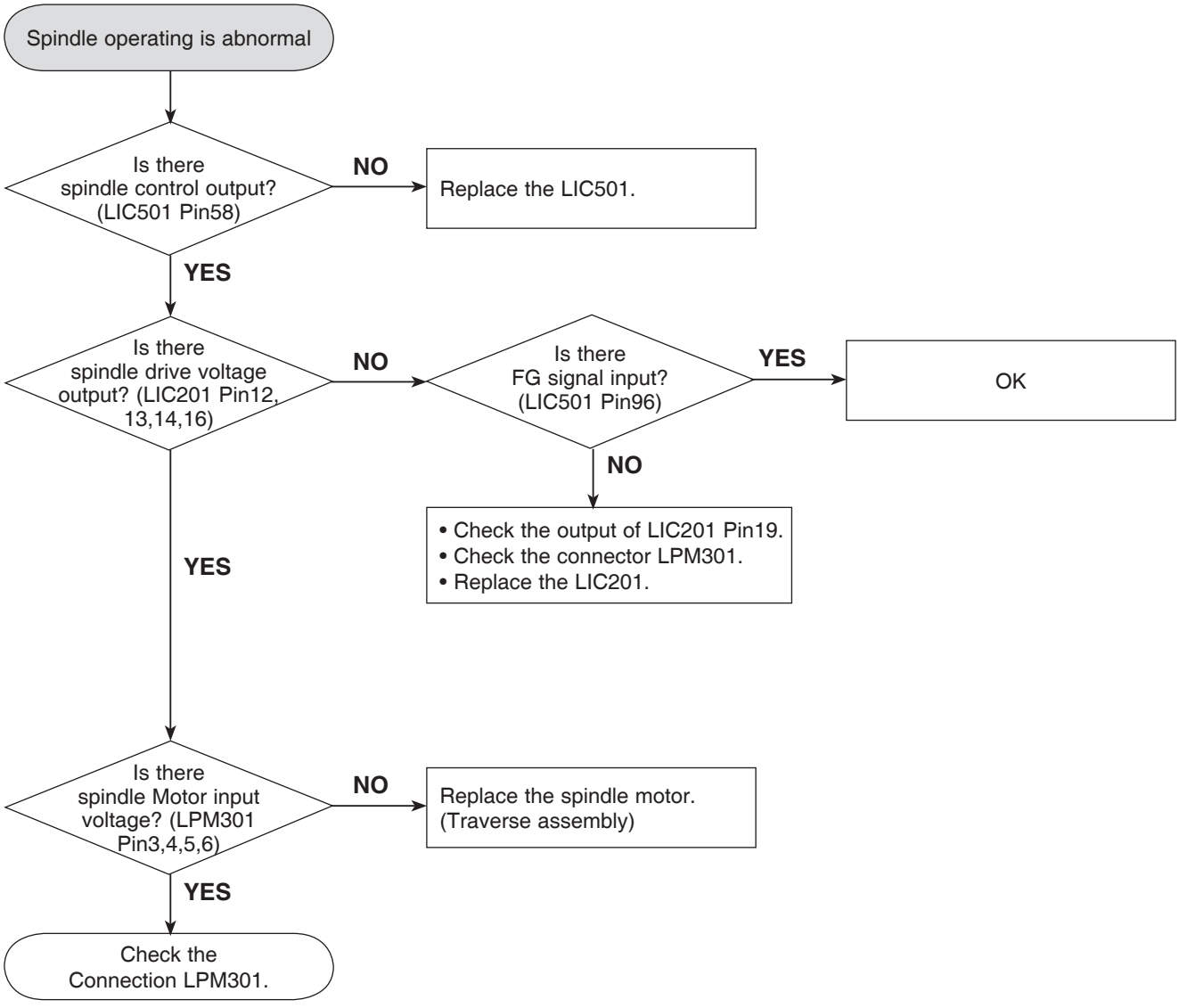
5. SPINDLE OPERATING IS ABNORMAL



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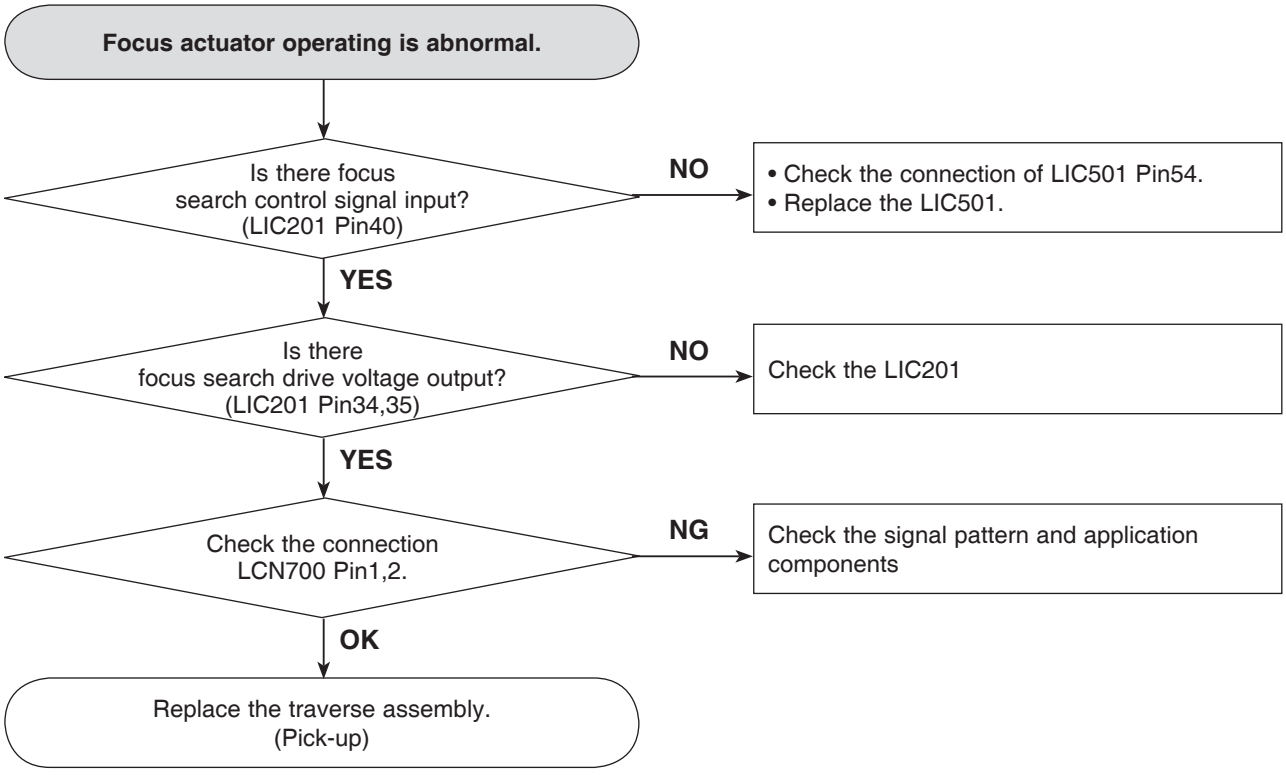
6. FOCUS ACTUATOR OPERATING IS ABNORMAL



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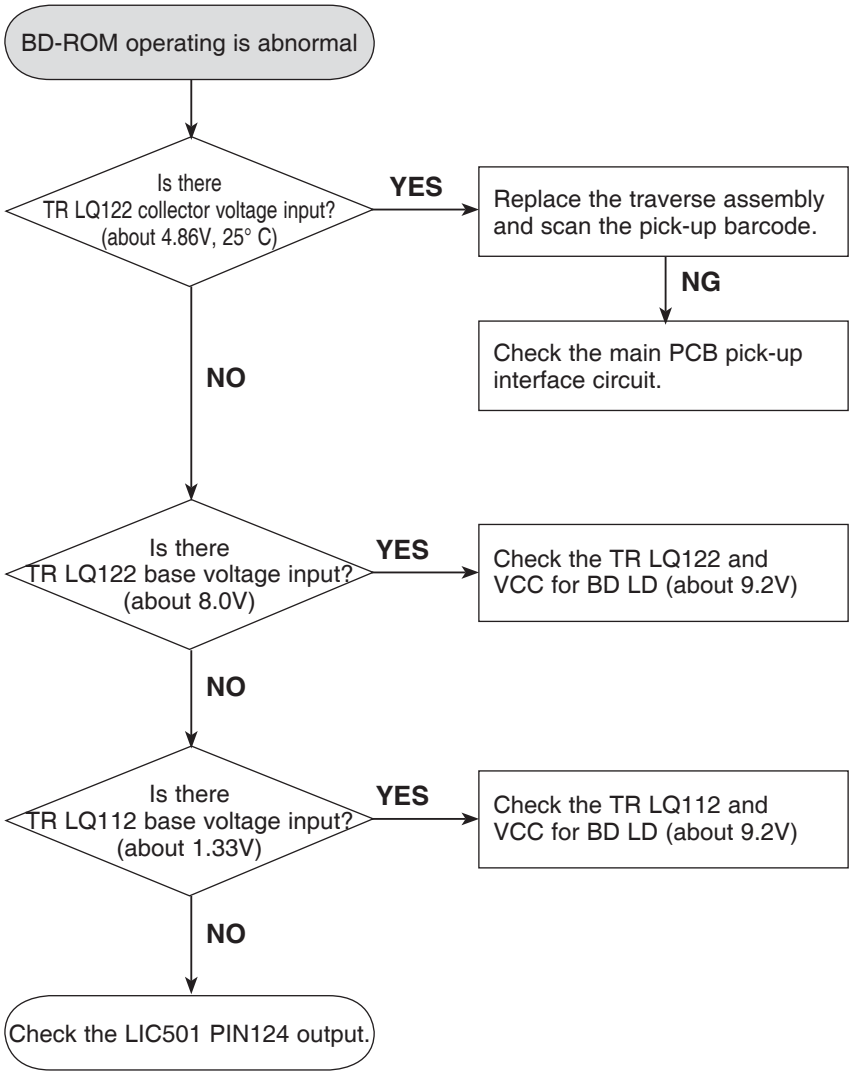
7. LASER OPERATING IS ABNORMAL

7-1. BD-ROM



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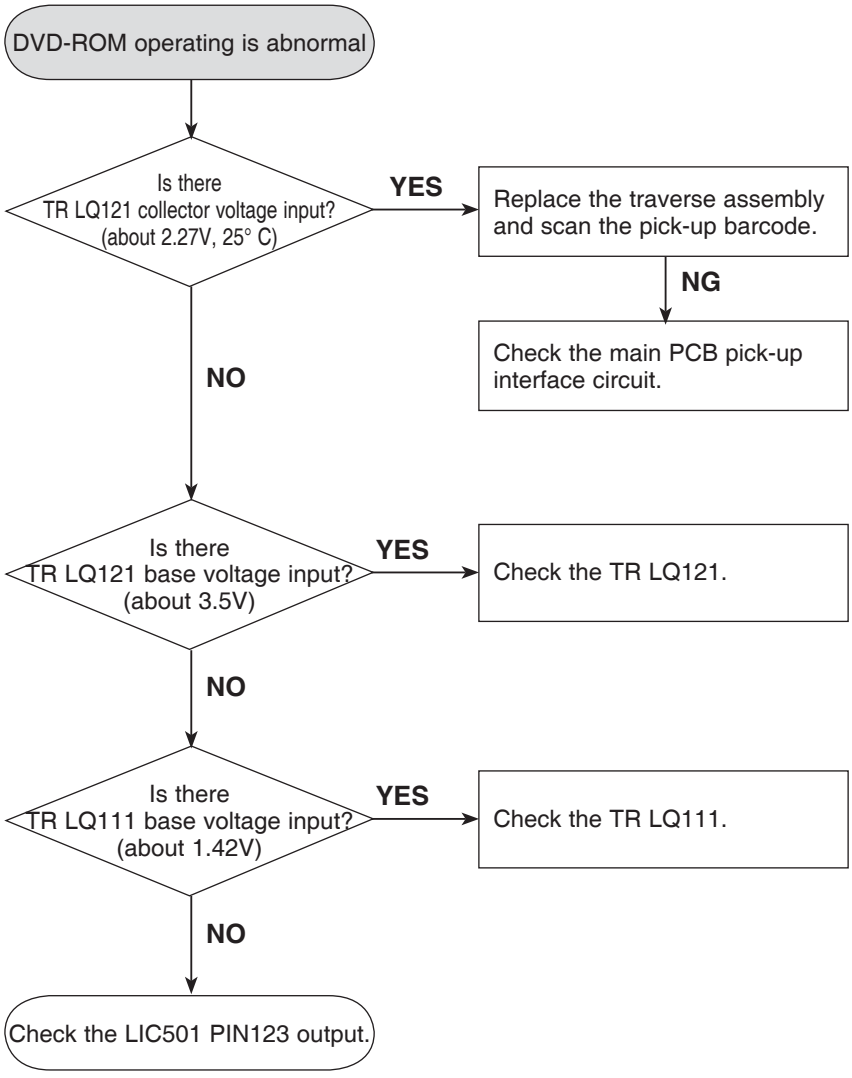
7-2. DVD-ROM



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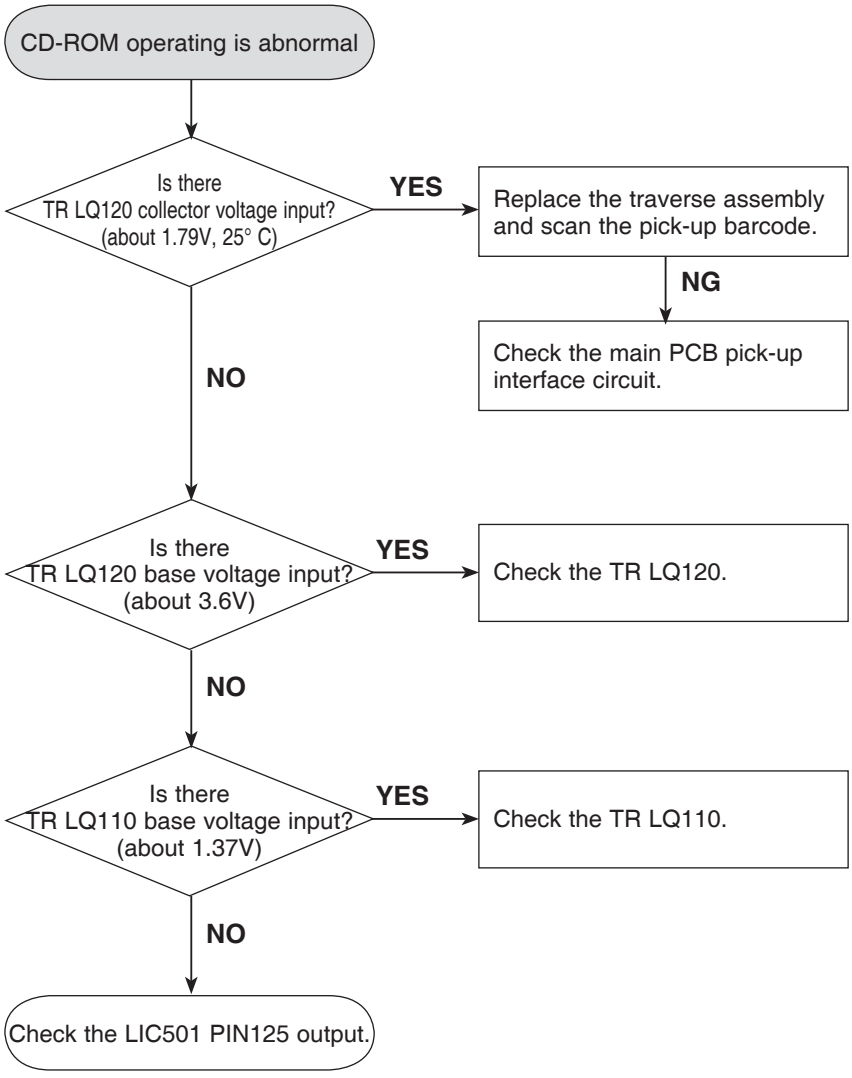
7-3. CD-ROM



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HOW TO USE THE BAR-CODE SCAN TOOL

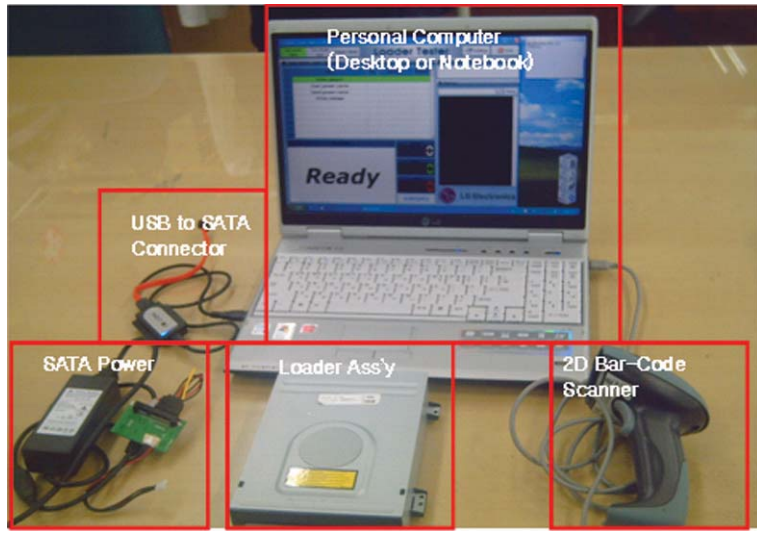
Bar-Code Scan Tool inserts the Bar-code values (including Skew, Read power, HFM, LD power and so on) to the Flash-ROM in the Loader Main Board. So, In case of changing the Traverse assembly or Loader main board, It is required to pick-up Bar-code scan procedure.

1. BAR-CODE SCAN SYSTEM CONFIGURATION

In order to insert Bar-code values (including Skew, Read power, HFM, LD power and so on), the following equipments are needed.

Compulsory equipments

1) Personal Computer
2) Bar-Code Scan Tool (Loader Tester)
3) 2D Bar-Code Scanner
4) Target Loader Ass'y
5) USB to SATA Connector
6) Power Supply



2. PICK-UP BAR-CODE SCAN TOOL CONFIGURATION.

The Loader Tester is the Application Tool for FA Test and also Bar-Code Scan.

The Bar-Code Scan is the one of functions in the Loader Tester.
Therefore the Bar-Code scan Users should check "only Bar Code" up in the Loader Tester.
Loader Tester Program consists of total 2 files.

Setup.exe
Setup.exe.txt

Setup.exe file is the installation file.
After you install the Loader Tester program, the **LoaderTest.exe** file will appear in the wallpaper(background) of Windows.
LoaderTester.exe is a program execution file.
Setup.exe.txt is the install Report file.

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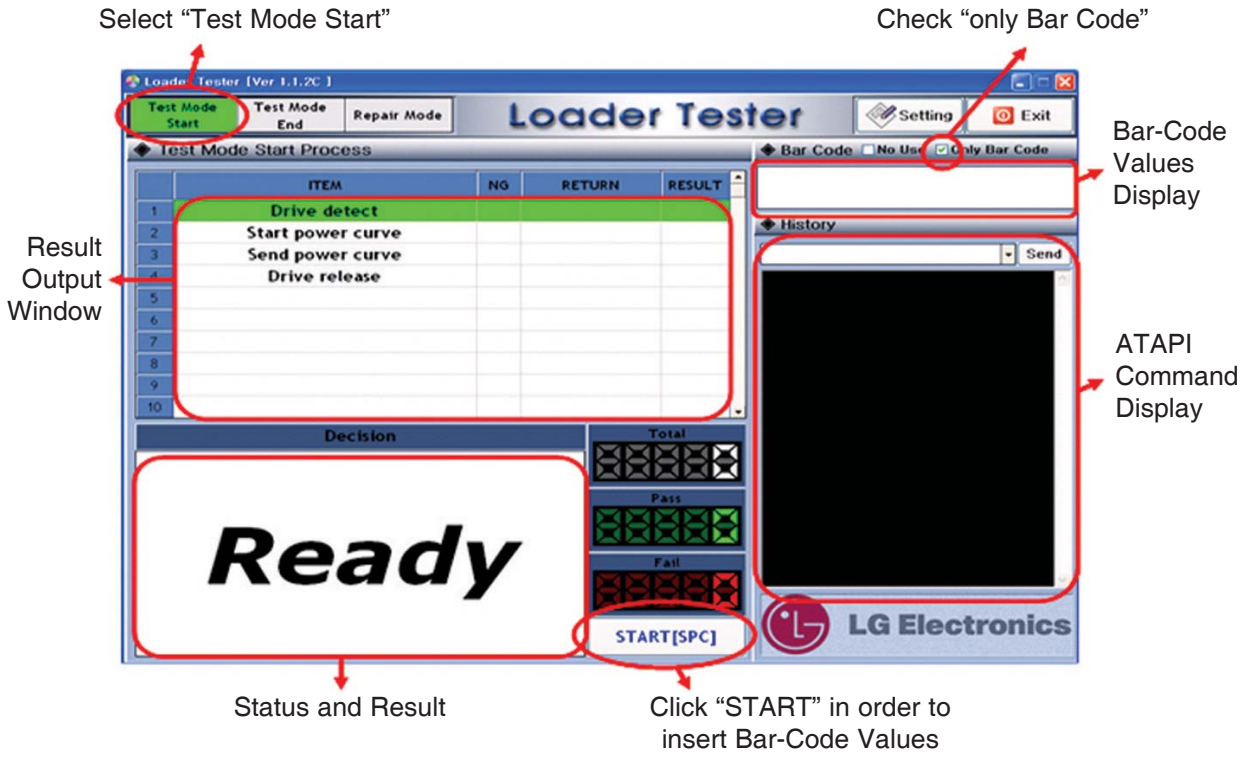
3. RUNNING BAR-CODE SCAN TOOL

When running “LoaderTester.exe” file in the wallpaper(background) of Windows, the following screen appears.
Before you start to click “Start” button, remind these.

1) “Test Mode Start” should be selected.

2) Check “only Bar Code”

3) Click “START” START[SPC]



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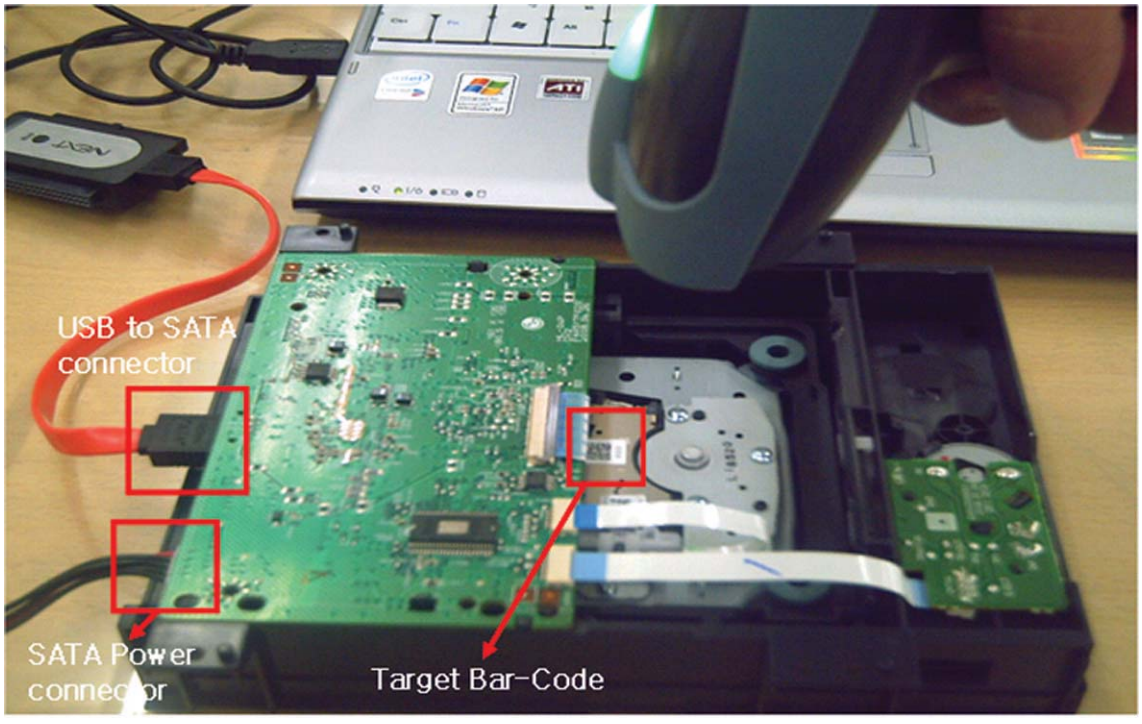
4. BAR-CODE SCAN PROCEDURE

1) Untie the screw of Loader.
2) Connect the “USB to SATA connector” and “SATA Power” to the Loader.
3) Connect the “USB to SATA connector” to the PC.
4) Connect the “Bar-Code Scanner” to the PC.
5) Run the Bar-Code Scan Tool (Loader Tester).
6) Click “Start” Button START[SPC]

   (Tip. If Drive can not be detected, please plug off and on again the “USB to SATA connector” to the PC and wait for 15 seconds.)

7) Sled will move the innermost.
8) Focus on the target of Bar-Code and Pull the trigger of Bar-Code scanner until Bar-Code can be scanned to the Bar-Code scan Tool (Loader Tester)
9) If Bar-Code scan succeeds, “ OK” will display in the result windows.
   However, Bar-Code scan fails, “NG” will display in the result windows.
   In case you got “ NG” result, please check procedure up from 2 to 8. then try it again.



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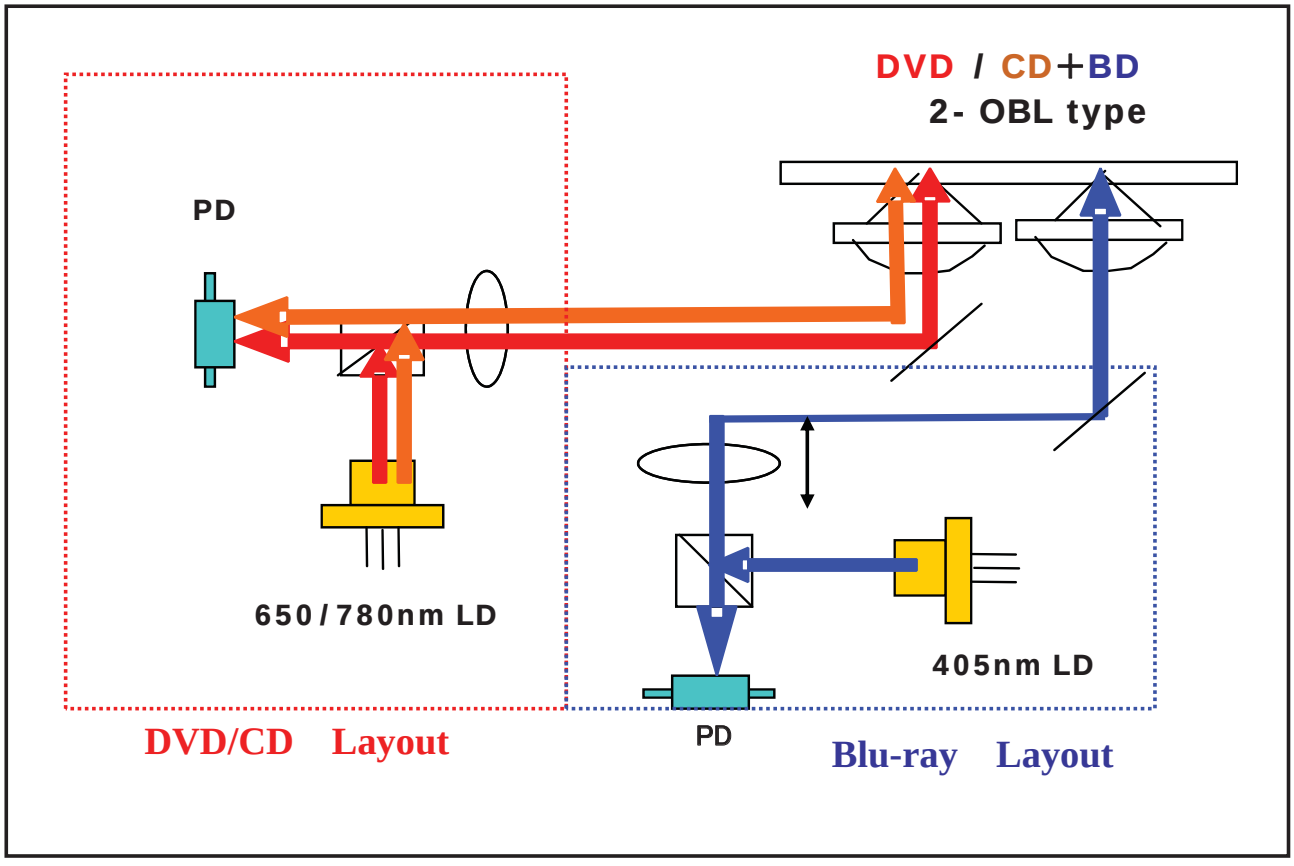
INTERNAL STRUCTURE OF THE PICK-UP

1. OPTICAL LAYOUT



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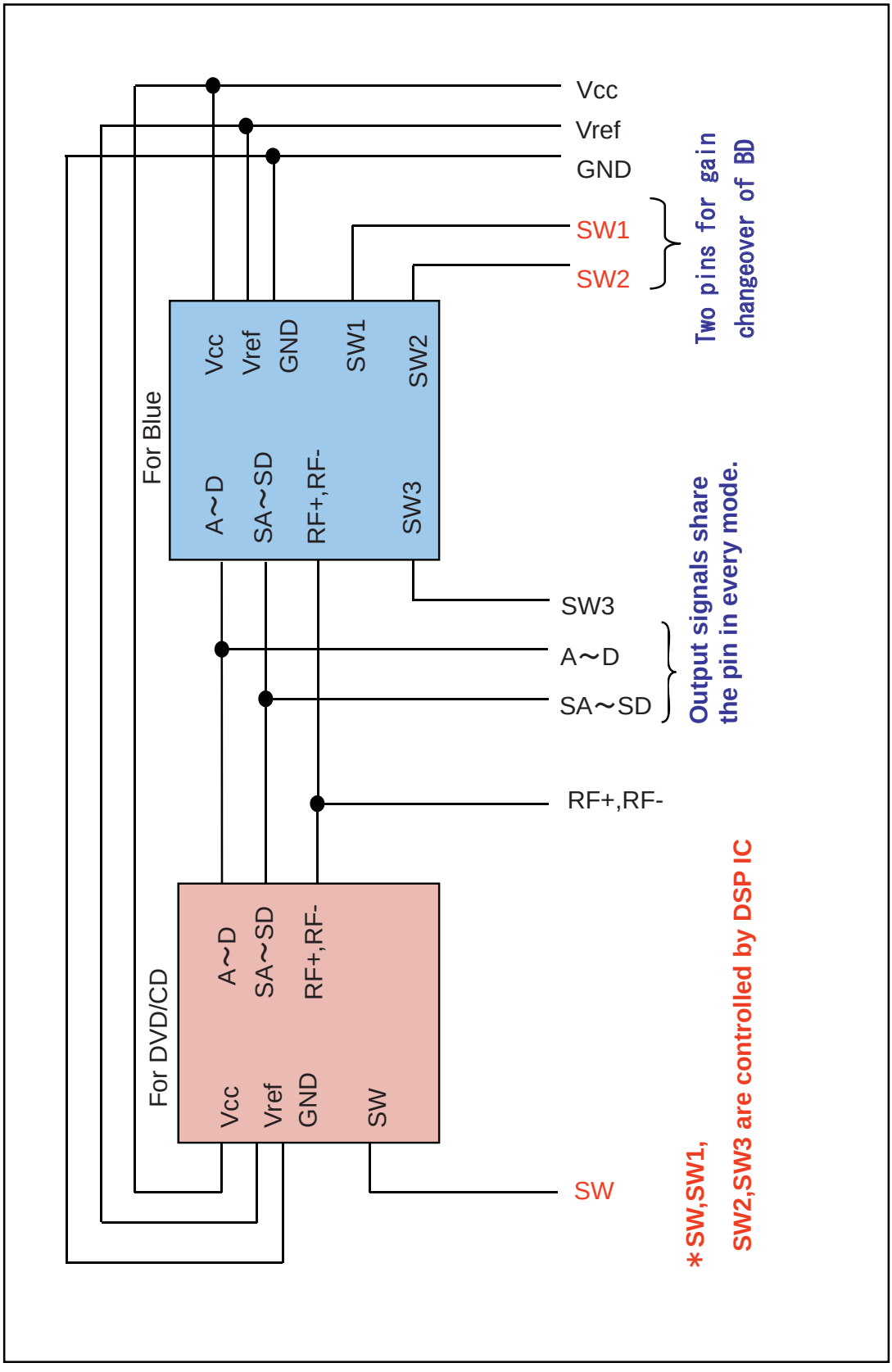
2. SF-BD412 PDIC COMPOSITION



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3. PICK-UP CONNECTOR TERMINAL PIN ASSIGNMENTS

PIN NO.	PIN NAME		DESCRIPTION
1	FCS2+	ACT	FOCUSING2+
2	FCS2-		FOCUSING2-
3	TRK+		TRACKING+
4	FCS1+		FOCUSING1+
5	TRK-		TRACKING-
6	FCS1-		FOCUSING1-
7	A-	CL SHIFTER	Stepping Motor A- Terminal
8	B-		Stepping Motor B- Terminal
9	A+		Stepping Motor A+ Terminal
10	B+		Stepping Motor B+ Terminal
11	NC		NC
12	NC		NC
13	NC		NC
14	A	PDIC	A output
15	B		B output
16	C		C output
17	D		D output
18	SA		SA output
19	SB		SB output
20	SC		SC output
21	SD		SD output
22	SW3		PDIC BD Sub Output Switch Port
23	RF+		RF(+)output for BD/DVD/CD
24	RF-		RF(-)output for BD/DVD/CD
25	SWB2		SW for PDIC,BD Gain and sleep
26	SWB1		SW for PDIC,BD Gain and sleep
27	VREF_PD		PDIC Reference Supply Terminal 2.1V
28	VCC_+5PD		PDIC Power Terminal 5V
29	GND_PD		GND for PDIC
30	SW		2-Wavelength PDIC DVD/CD/Sleep Changeover SW
31	GND1	LDD HFM IC Monitor	GND for LD & HFM IC
32	LDI_BD		LD control for BD_LD
33	LDI_CD		LD control for CD_LD
34	LDI_DVD		LD control for DVD_LD
35	GND1		GND for LD & HFM IC
36	TEMP		Thermister
37	VCC		VCC for HFM IC
38	MON_CD/DVD		Monitor output for DVD & CD
39	MON_BD		Monitor output for BD
40	SEL_DVD		Select input for DVD Monitor(L:enable)
41	SEL_CD		Select input for CD Monitor(L:enable)
42	NC		NC
43	NC		NC
44	GND1		GND for LD & HFM IC
45	GND_BDBM		GND for Back monitor PD,BD

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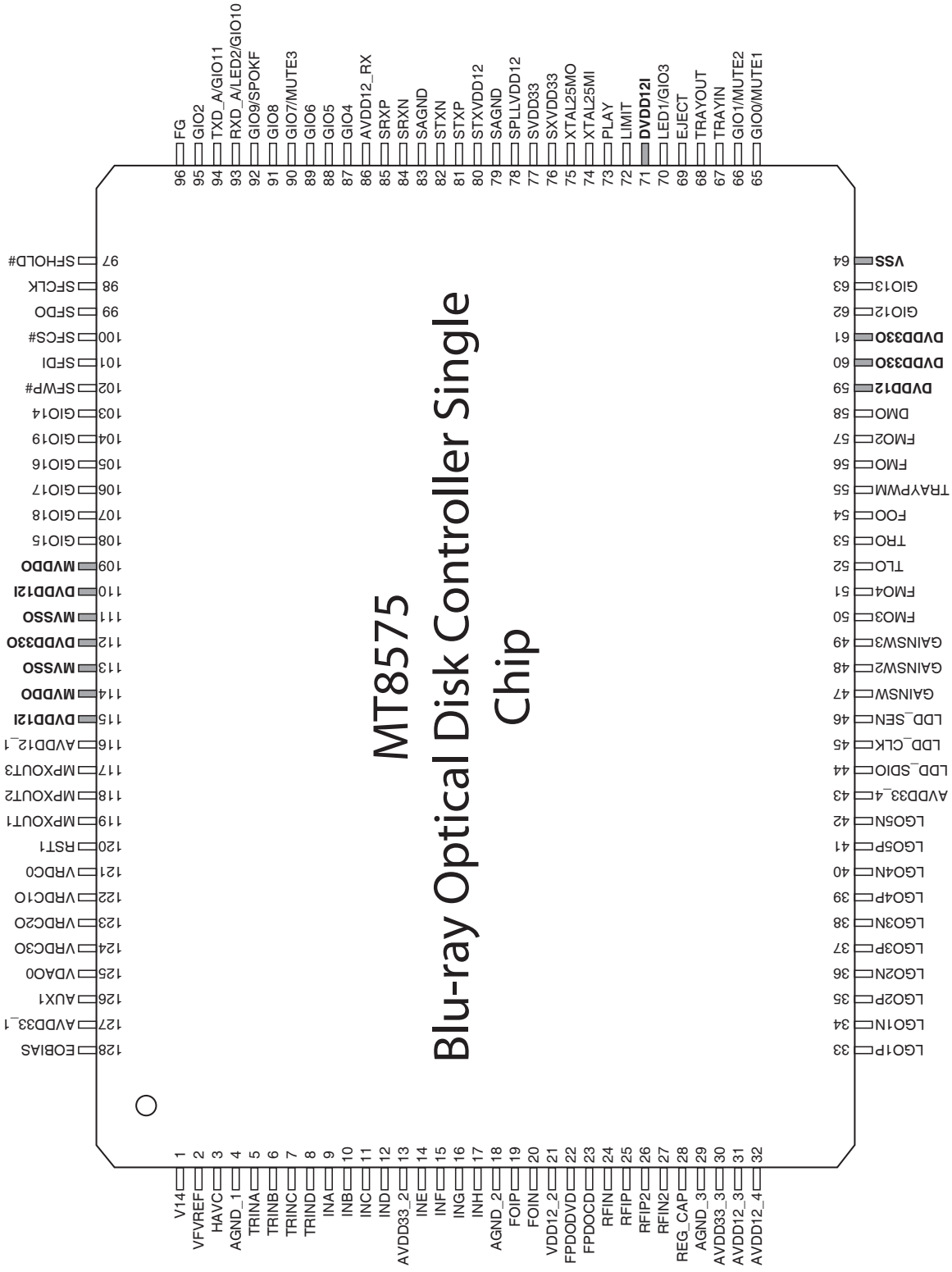
MAJOR IC INTERNAL BLOCK DIAGRAM AND PIN DESCRIPTION

1. LIC501 (MT8575) : Blu-ray SIGNAL PROCESSOR SINGLE CHIP

1-1. Pin Assignment



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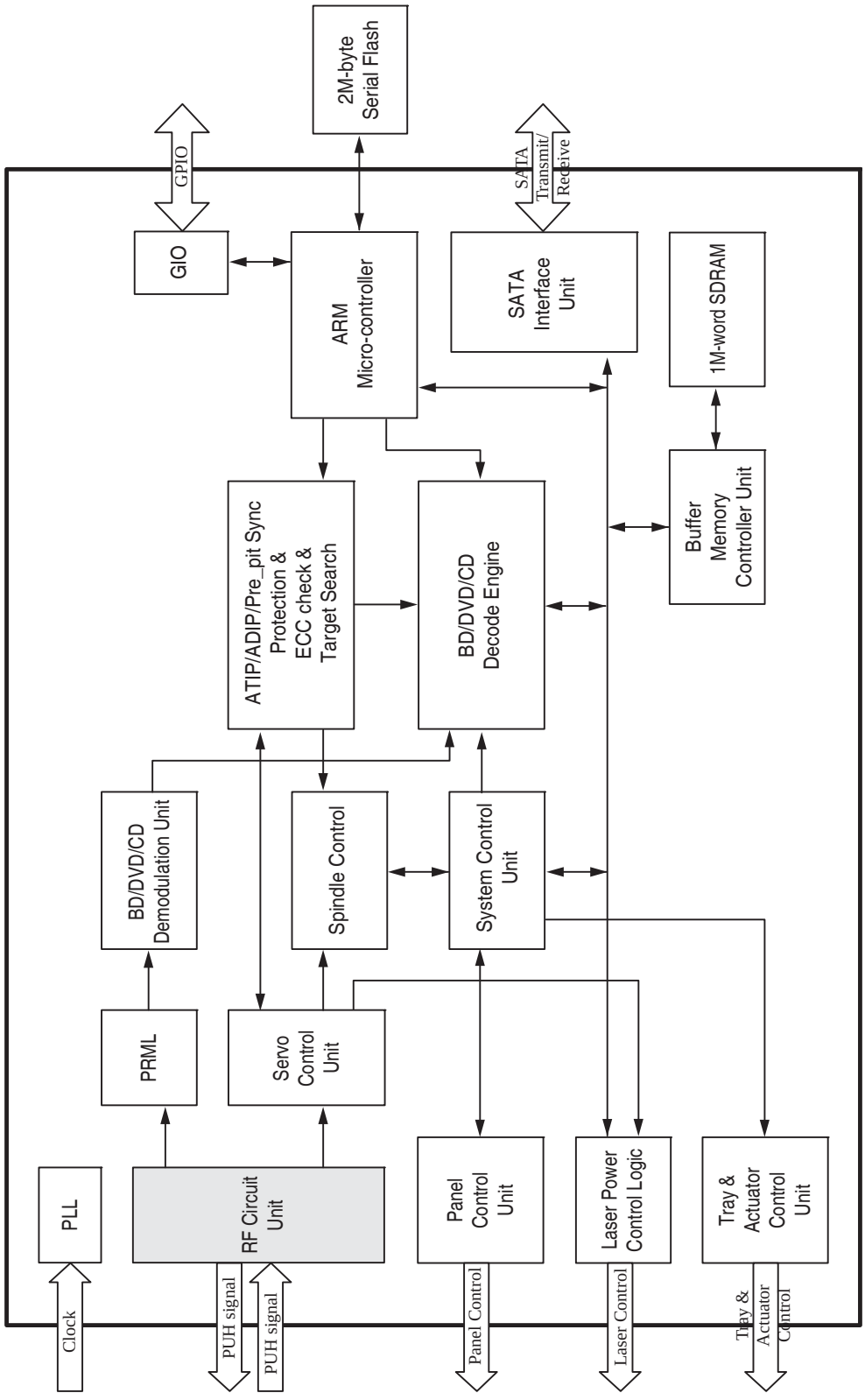
1-2. Block Diagram



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1-3. Pin Function

PIN NO	PIN NAME	TYPE	DESCRIPTION
RF Signals & S/H Control Pulses (21)			
5	TRINA	Analog Input	Input of Tracking Signal (A)
6	TRINB	Analog Input	Input of Tracking Signal (B)
7	TRINC	Analog Input	Input of Tracking Signal (C)
8	TRIND	Analog Input	Input of Tracking Signal (D)
9	INA	Analog Input	Input of Main Beam Signal (A)
10	INB	Analog Input	Input of Main Beam Signal (B)
11	INC	Analog Input	Input of Main Beam Signal (C)
12	IND	Analog Input	Input of Main Beam Signal (D)
14	INE	Analog Input	Input of Sub-Beam Signal (E)
15	INF	Analog Input	Input of Sub-Beam Signal (F)
16	ING	Analog Input	Input of Sub-Beam Signal (G)
17	INH	Analog Input	Input of Sub-Beam Signal (H)
19	FOIP/RRFSUM	Analog Input	Input of Focusing Signal (Positive) Alternative Function : Read RF sum
20	FOIN	Analog Input	Input of Focusing Signal (Negative)
24	RFIN	Analog Input	Differential Input of AC Coupling RF SUM Signal (Negative)
25	RFIP	Analog Input	Differential Input of AC Coupling RF SUM Signal (Positive)
26	RFIP2	Analog Input	Differential Input of AC Coupling RF SUM Signal (Positive)
27	RFIN2	Analog Input	Differential Input of AC Coupling RF SUM Signal (Negative)
47	GAINSW	Analog Output	Read gain switch. 1
48	GAINSW2	Analog Output	Read gain switch 2.
49	GAINSW3	Analog Output	Read gain switch 3.
EQRF Circuits (1)			
128	EQBIAS	Analog Output	External Bias Connection for Circuits in EQRF Block & SATA Block. The external resistor need meet the precision for SATA requirement. (23.1K, 1%)
APC (Auto Power Control for Laser) (6)			
22	FPDODVD	Analog Input	Laser Power Monitor Input for DVD APC / Differential positive input
23	FPDOCD	Analog Input	Laser Power Monitor Input for CD APC / Differential negative input
121	VRDCO	Analog Output	Output Voltage of Laser Diode Control in Read APC
122	VRDC1O	Analog Output	Output Voltage 1 of Laser Diode Control in Read APC
123	VRDC2O	Analog Output	Output Voltage 2 of Laser Diode Control in Read APC
124	VRDC3O	Analog Output	Output Voltage 3 of Laser Diode Control in Read APC
Reference Voltages & DACs (5)			
1	V14	Analog Output	Output of Voltage Reference (1.4V)
2	VFVREF	Analog Output	Output of Voltage Reference
3	HAVC	Analog Output	Decoupling Pin for Reference Voltage of Main and Sub Beams
28	REG_CAP	Analog Output	Output of Voltage Reference
125	VDAC0	Analog Output	Output of General DAC
MPXOUT (Multiplexer Circuit for Various Signals) and Testing Interface (4)			
117	MPXOUT3/MON/GO	Analog Output	Multiplexer Output 3 for Signal Monitoring. Alternate function : Internal monitored signal output / General output.
118	MPXOUT2/MON/GO	Analog Output	Multiplexer Output 2 for Signal Monitoring. Alternate function : Internal monitored signal output / General output.
119	MPXOUT1/MON/GO	Analog Output	Multiplexer Output 1 for Signal Monitoring. Alternate function : Internal monitored signal output / General output
126	AUX1	Analog I/O	Auxiliary Input.Alternative Function : Signal Monitoring
RF Power Supplies (11)			
4	AGND_1	Analog Ground	Ground Pin
13	AVDD33_2	Analog Power(3.3V)	Power Pin
18	AGND_2	Analog Ground	Ground Pin
21	AVDD12_2	Analog Power(1.2V)	Power Pin
29	AGND_3	Analog Ground	Ground Pin
30	AVDD33_3	Analog Power(3.3V)	Power Pin

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PIN NO	PIN NAME	TYPE	DESCRIPTION
31	AVDD12_3	Analog Power(1.2V)	Power Pin
32	AVDD12_4	Analog Power(1.2V)	Power Pin
43	AVDD33_4	Analog Power(3.3V)	Power Pin
116	AVDD12_1	Analog Power(1.2V)	Power Pin
127	AVDD33_1	Analog Power(3.3V)	Power Pin
Low-Speed General Output (10)			
33	LGO1P	Analog Output	Lowspeed General Output 1P
34	LGO1N	Analog Output	Lowspeed General Output 1N
35	LGO2P	Analog Output	Lowspeed General Output 2P
36	LGO2N	Analog Output	Lowspeed General Output 2N
37	LGO3P	Analog Output	Lowspeed General Output 3P
38	LGO3N	Analog Output	Lowspeed General Output 3N
39	LGO4P	Analog Output	Lowspeed General Output 4P
40	LGO4N	Analog Output	Lowspeed General Output 4N
41	LGO5P	Analog Output	Lowspeed General Output 5P Alternative Function : Read gain switch 4
42	LGO5N	Analog Output	Lowspeed General Output 5N Alternative Function : Read gain switch 5
MOTOR (10)			
50	FMO3	Analog I/O	Feed motor 3 control. PWM output. Alternative Function : Auxiliary servo input
51	FMO4	Analog I/O	Feed motor 4 control. PWM output. Alternative Function : Auxiliary servo input
52	TLO	Analog Output	Tilt servo output
53	TRO	Analog Output	Tracking servo output. PDM output of tracking servo compensator.
54	FOO	Analog Output	Focus servo output. PDM output of focus servo compensator.
55	TRAYPWM	Analog Output	Tray PWM control output. Controlled by µ P.
56	FMO	Analog Output	Feed motor control. PWM output.
57	FMO2	Analog Output	Feed motor 2 control. PWM output.
58	DMO	Analog Output	Disk motor control output. PWM output.
96	FG	3.3V LVTTL I/O, 5V-tolerance,1 2mA PDR, 75K pull-up.	Motor Hall sensor input. The pin is spike-free at power-on stage.
SATA Interface (10)			
77	SVDD33	Analog Power(3.3V)	Power supply for SATA 3.3V circuitry
78	SPLLVDD12	Analog Power(1.2V)	Power supply for SATA circuitry
79	SAGND	Analog Ground	Ground Pin for SATA circuitry
80	STXVDD12	Analog Power(1.2V)	Power supply for SATA transmit circuitry
81	STXP	Analog Output	Differential serial output transmit signal of SATA
82	STXN	Analog Output	Differential serial output transmit signal of SATA
83	SAGND	Analog Ground	Ground Pin for SATA circuitry
84	SRXN	Analog Input	Differential input receive signal of SATA
85	SRXP	Analog Input	Differential input receive signal of SATA
86	AVDD12_RX	Analog Power(1.2V)	Power supply for SATA circuitry
Crystal Interface (3)			
74	XTAL25MI	Input	X`tal input. The working frequency is 25MHz.
75	XTAL25MO	Output	X`tal output.
76	SXVDD33	Analog Power(3.3V)	Power supply for X`ftal circuitry
Serial Flash (6)			
97	SFHOLD#	3.3V LVTTL I/O, 5V-tolerance, 4,8,12,16mA PDR, 75K pull-up	Hold in normal serial flash mode but in quad I/O, as serial data input/data output
98	SFCLK		serial flashÅfs clock output
99	SFDO		serial data outputrial
100	SFCS#		chip select output
101	SFDI		serial data input
102	SFWP#		Write protection in normal serial flash mode but in quad I/O, as serial data input/data output

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PIN NO	PIN NAME	TYPE	DESCRIPTION
LDD serial interface (3)			
44	LDD_SDIO	3.3V LVTTL I/O, 5V-tolerance, 2,4,6,8mA PDR, 75K pull-up	LDD serial interface data. The pin is spike-free at power-on stage.
45	LDD_CLK		LDD serial interface CLK. The pin is spike-free at power-on stage.
46	LDD_SEN		LDD serial interface command enable. The pin is spike-free at power-on stage.
Panel & sense key (5)			
67	TRAYIN	3.3V LVTTL I/O, 5V-tolerance, 12mA,75K pull-up	Tray_is_in Input, A Logical Low Indicates the Tray is IN. Feedback Flag is from Tray Connector. The pin is spike-free at power-on stage.
68	TRAYOUT		Tray_is_out Input. A Logical Low Indicates the Tray is OUT. Feedback Flag is from Tray Connector. The pin is spike-free at power-on stage.
69	EJECT		Eject/stop key input, active low. The pin is spike-free at power-on stage.
72	LIMIT		Sledge Inner Limit Input, Active Low. The pin is spike-free at power-on stage. Alternate function : 1. Internal monitored signal output
73	PLAY		Play/pause key input, active low. The pin is spike-free at power-on stage.
MISC & GIO function (21)			
120	RSTI	Analog Input	Internal power on reset detection input.
62	GIO12	3.3V LVTTL I/O, 5V-tolerance, 4,8,12,16mA PDR, 75K pull-up	General IO
63	GIO13		General IO.
65	GIO0/MUTE1		General IO
66	GIO1/MUTE2	3.3V LVTTL I/O, 5V-tolerance, 4,8,12,16mA PDR, 75K pull-down	General IO
70	LED1/GIO3		LED Control Output. Initial 0 Output. The pin is spike-free at power-on stage. Alternate function : General I/O
87	GIO4	3.3V LVTTL I/O	General IO.
88	GIO5	3.3V LVTTL I/O	General IO.
89	GIO6	3.3V LVTTL I/O	General IO.
90	GIO7/MUTE3	3.3V LVTTL I/O, 5V-tolerance, 4,8,12,16mA PDR, 75K pull-down	General IO. The pin is spike-free at power-on stage.
91	GIO8		General IO.
92	GIO9/SPOKE		General IO.The pin is spike-free at power-on stage. The pin is not allowed to pull-up in circuit layout. Alternate function : Spoke input.
93	RXD_A/ LED2/GIO10		PC RS232 serial receive data. The pin is spike-free at power-on stage. Alternate function : 1. LED Control Output. Initial “0” Output 2. General IO.
94	TXD_A/GIO11		PC RS232 serial transmit data. The pin is spike-free at power-on stage. Alternate function : 1. LED Control Output. Initial “0” Output 2. General IO.
95	GIO2		General IO
103	GIO14		General IO
104	GIO19		General IO
105	GIO16		General IO
106	GIO17		General IO
107	GIO18		General IO
108	GIO15		General IO The pin is not allowed to pull-up in circuit layout.
Digital Power Pins (11)			
60,61,112	DVDD33O	Digital Power (3.3V)	VDD for digital pad.
109,114	MVDDQ	DRAM Power (3.3V)	VDD for pad output buffer of DRAM die.
111,113	MVSSQ	DRAM Ground	VSS for pad output buffer of DRAM die.
59,71, 110,115	DVDD12I	Digital Power (1.2V)	VDD for internal circuit.
64	VSS	Digital Ground	VSS for digital pad

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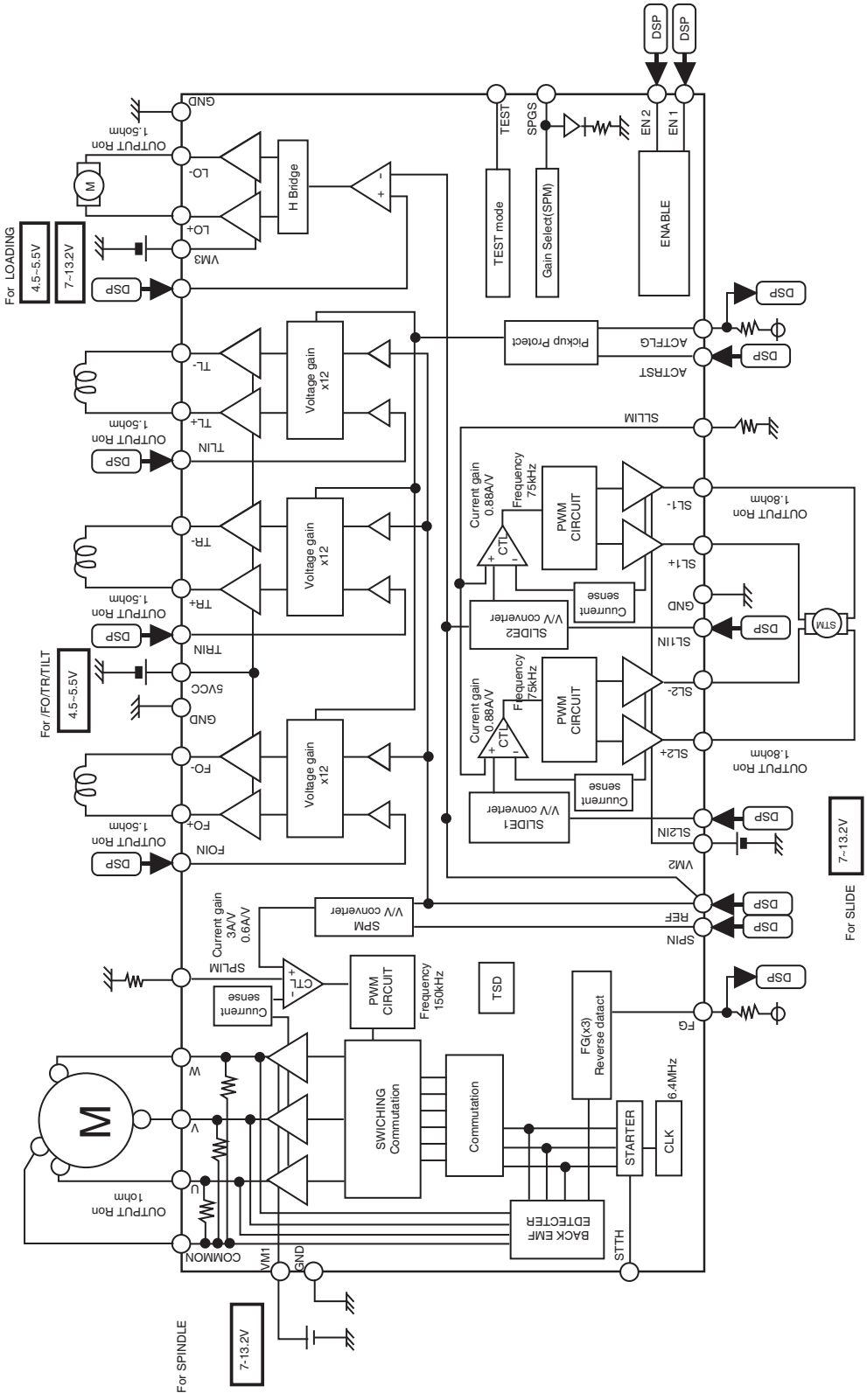
2. LIC201 (R2A30232SP) : SPINDLE MOTOR AND 6CH ACTUATOR DRIVER

2-1. Block Diagram



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2-2. Pin Function

PIN NO	SYMBOL	FUNCTION
1	SPIN	Spindle control voltage input
2	SL1IN	Slide control voltage input 1
3	SL2IN	Slide control voltage input ÇQ
4	SPLIM	Input terminal for spindle current limit
5	VM2	Motor Power Supply ÇQ(for Slide)
6	SL2+	Slide non-inverted output 2
7	GND	GND
8	SL2-	Slide inverted output 2
9	SL1+	Slide non-inverted output 1
10	SL1-	Slide inverted output 1
11	GND	GND
12	U	Motor drive output U
13	V	Motor drive output V
14	W	Motor drive output W
15	ACTFLG	Pickup protect flag output
16	COMMON	Motor common
17	TEST	Test
18	SLLIM	Input terminal for slide current limit
19	FG	Frequency generator output
20	EN1	Input terminal for enable 1
21	EN2	Input terminal for enable 2
22	VM1	Motor Power Supply 1(for Spindle)
23	SPGS	Input terminal for gain select SPM
24	STTH	Reference voltage for spindle start up
25	ACTRST	Pickup protect Reset
26	VM3	Power Supply3(for Loading)
27	LO+	Loading non-inverted output
28	LO-	Loading inverted output
29	GND	GND
30	TO-	Tracking inverted output
31	TO+	Tracking non-inverted output
32	5VCC	5V Power Supply (for FS,TS,TL)
33	GND	GND
34	FO+	Focus non-inverted output
35	FO-	Focus inverted output
36	TL+	Tilt non-inverted output
37	TL-	Tilt inverted output
38	TLIN	Tilt control voltage input
39	TOIN	Tracking control voltage input
40	FOIN	Focus control voltage input
41	LOIN	Loading control input
42	REF	Reference voltage input

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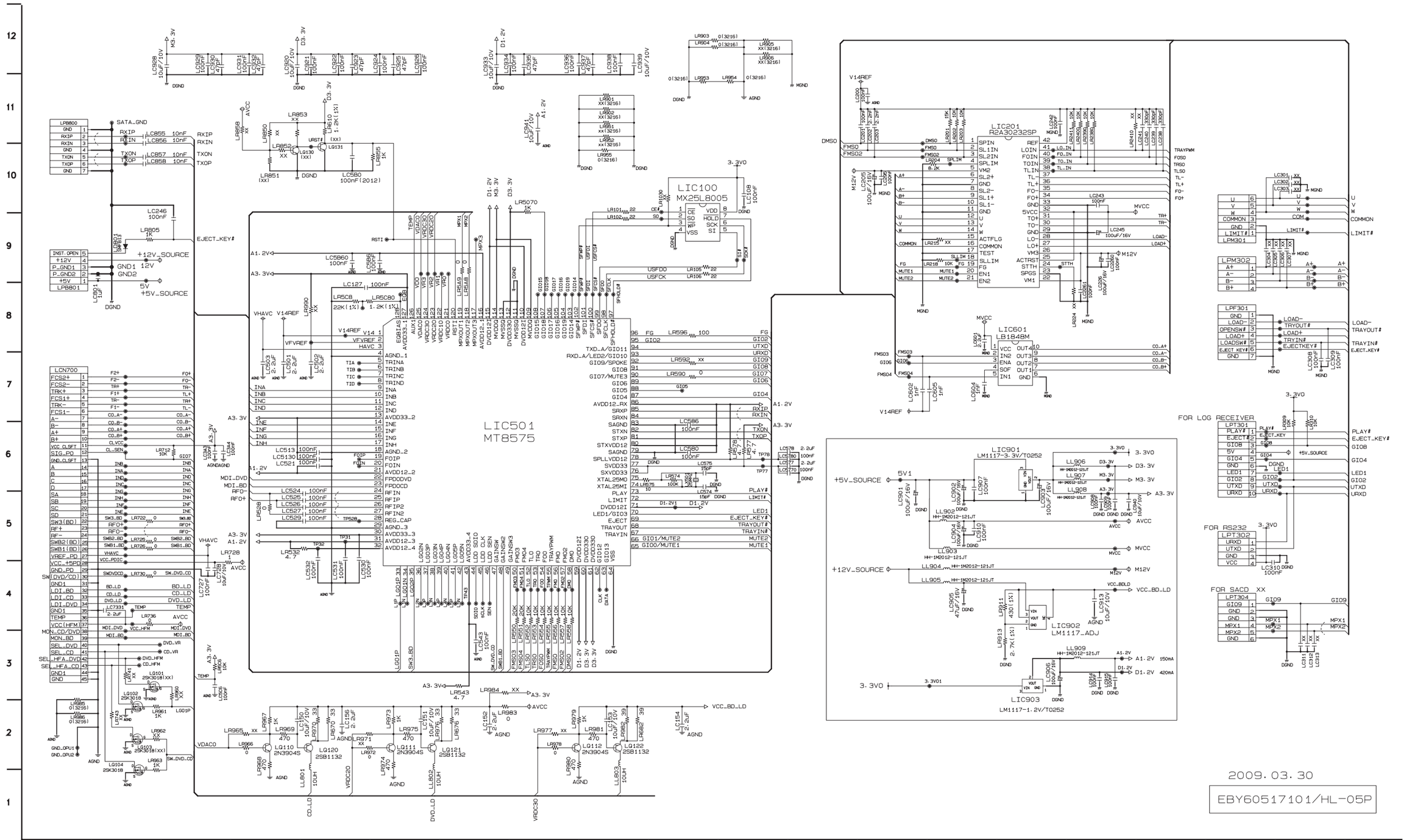
CIRCUIT DIAGRAM



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CIRCUIT VOLTAGE CHART

MODE: BD-ROM PLAYBACK

LIC100	
PIN NO.	**VOLTAGE**
1	0.00
2	PULSE
3	3.30
4	0.00
5	0.00
6	PULSE
7	3.30
8	3.30

LIC201	
PIN NO.	**VOLTAGE**
1	1.53
2	1.42
3	1.38
4	1.23
5	12.19
6	0.00
7	0.00
8	PULSE
9	PULSE
10	PULSE
11	0.00
12	4.50
13	4.50
14	4.50
15	0.01
16	4.50
17	0.00
18	1.24
19	1.64
20	3.30
21	3.30
22	12.19
23	0.00
24	2.13
25	4.94
26	12.19
27	0.68
28	0.62
29	0.00
30	2.39
31	2.49
32	4.94
33	0.00
34	2.60
35	0.00
36	2.49
37	2.40
38	1.41
39	1.41
40	1.43
41	1.41
42	1.41

LIC501	
PIN NO.	**VOLTAGE**
1	1.41
2	1.01
3	2.10
4	0.00
5	1.16
6	1.12
7	1.06
8	1.67
9	2.33
10	2.45
11	2.47
12	2.31
13	3.29
14	2.37
15	2.22
16	2.29
17	2.30
18	0.00
19	1.19
20	0.00
21	1.19
22	0.00
23	0.00
24	1.41
25	1.41
26	0.00
27	0.00
28	1.50
29	0.00
30	3.28
31	1.19
32	1.16
33	0.00
34	0.00
35	0.00
36	0.00
37	0.00
38	0.00
39	0.00
40	0.00
41	0.00
42	0.00
43	3.29
44	0.00
45	0.00
46	0.00
47	1.67
48	3.23
49	0.00
50	0.00
51	0.00
52	1.41
53	1.41
54	1.44
55	1.40
56	1.48
57	1.42
58	1.52
59	1.19
60	3.28
61	3.28
62	0.00
63	0.00
64	0.00
65	3.30
66	3.30
67	0.00
68	0.00
69	3.30
70	0.00
71	1.19
72	3.27
73	3.27
74	OSC
75	OSC
76	3.24
77	3.24
78	1.16
79	0.00
80	1.19
81	1.19
82	1.19
83	0.00
84	1.19
85	1.19
86	1.19
87	PULSE
88	0.00
89	0.00
90	2.87
91	0.00
92	0.00
93	PULSE
94	PULSE
95	0.00
96	PULSE
97	3.30
98	0.00
99	0.00
100	0.00
101	PULSE
102	3.30
103	3.30
104	3.30
105	3.30
106	3.30
107	3.30
108	3.30
109	3.30
110	1.19
111	0.00
112	3.30
113	0.00
114	3.30
115	1.19
116	1.19
117	1.12
118	1.40
119	3.29
120	1.50
121	0.00
122	1.50
123	0.00
124	1.32
125	0.00
126	1.44
127	3.24
128	1.35

LIC601	
PIN NO.	**VOLTAGE**
1	4.94
2	2.20
3	0.00
4	4.40
5	2.27
6	0.00
7	0.3
8	0.3
9	0.3
10	0.3

LIC901	
PIN NO.	**VOLTAGE**
1	0.00
2	3.30
3	5.05

LIC902	
PIN NO.	**VOLTAGE**
1	6.93
2	8.18
3	12.19

LIC903	
PIN NO.	**VOLTAGE**
1	0.00
2	1.20
3	3.30

LQ110	
PIN	**VOLTAGE**
Emitter	0.00
Collector	4.93
Base	0.00

LQ111	
PIN	**VOLTAGE**
Emitter	0.00
Collector	4.93
Base	0.00

LQ112	
PIN	**VOLTAGE**
Emitter	0.67
Collector	7.97
Base	1.33

LQ120	
PIN	**VOLTAGE**
Emitter	4.93
Collector	0.00
Base	4.93

LQ121	
PIN	**VOLTAGE**
Emitter	4.93
Collector	0.00
Base	4.93

LQ122	
PIN	**VOLTAGE**
Emitter	8.68
Collector	4.86
Base	8.00

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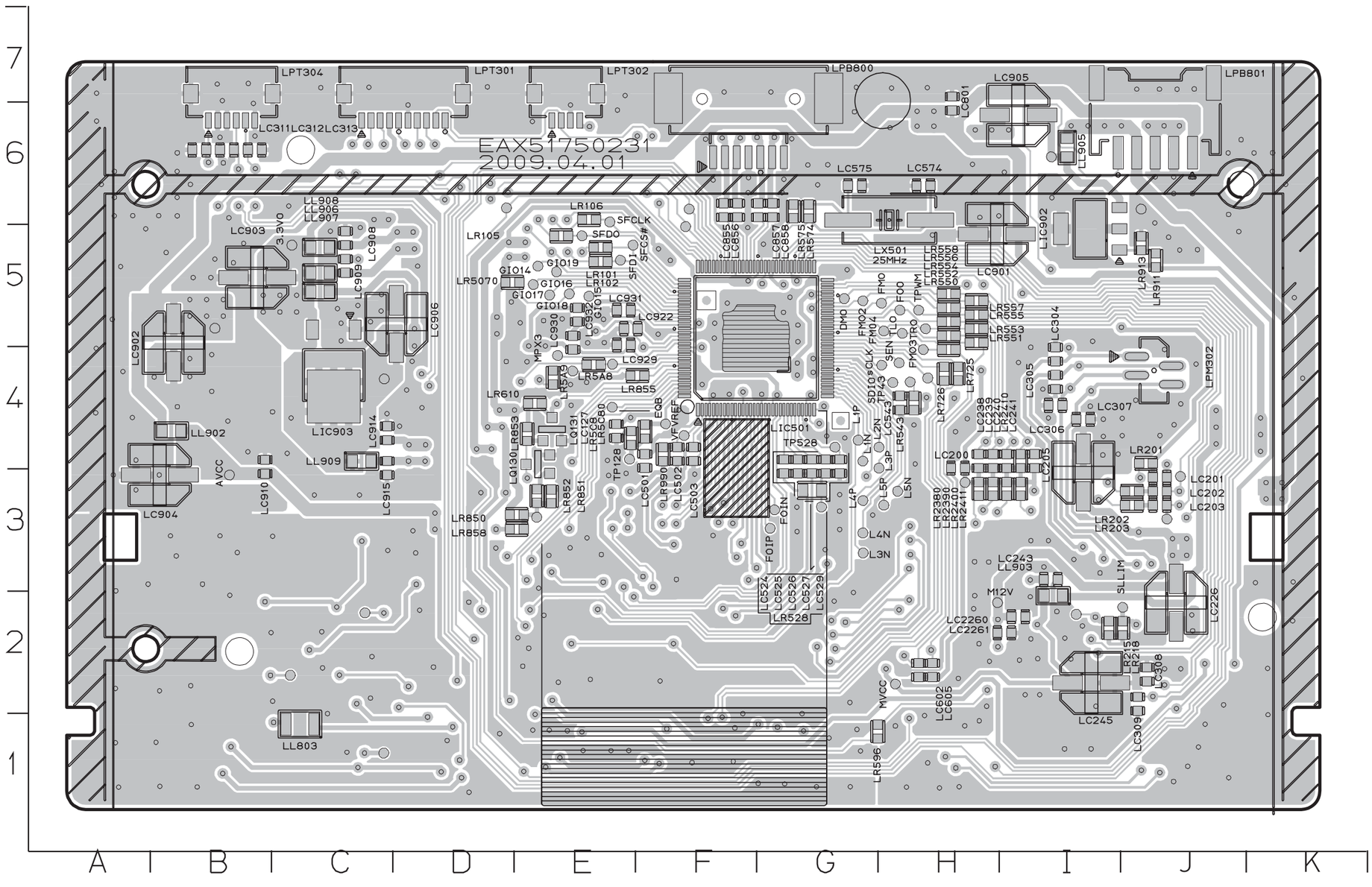
PRINTED CIRCUIT BOARD DIAGRAMS

(TOP VIEW)



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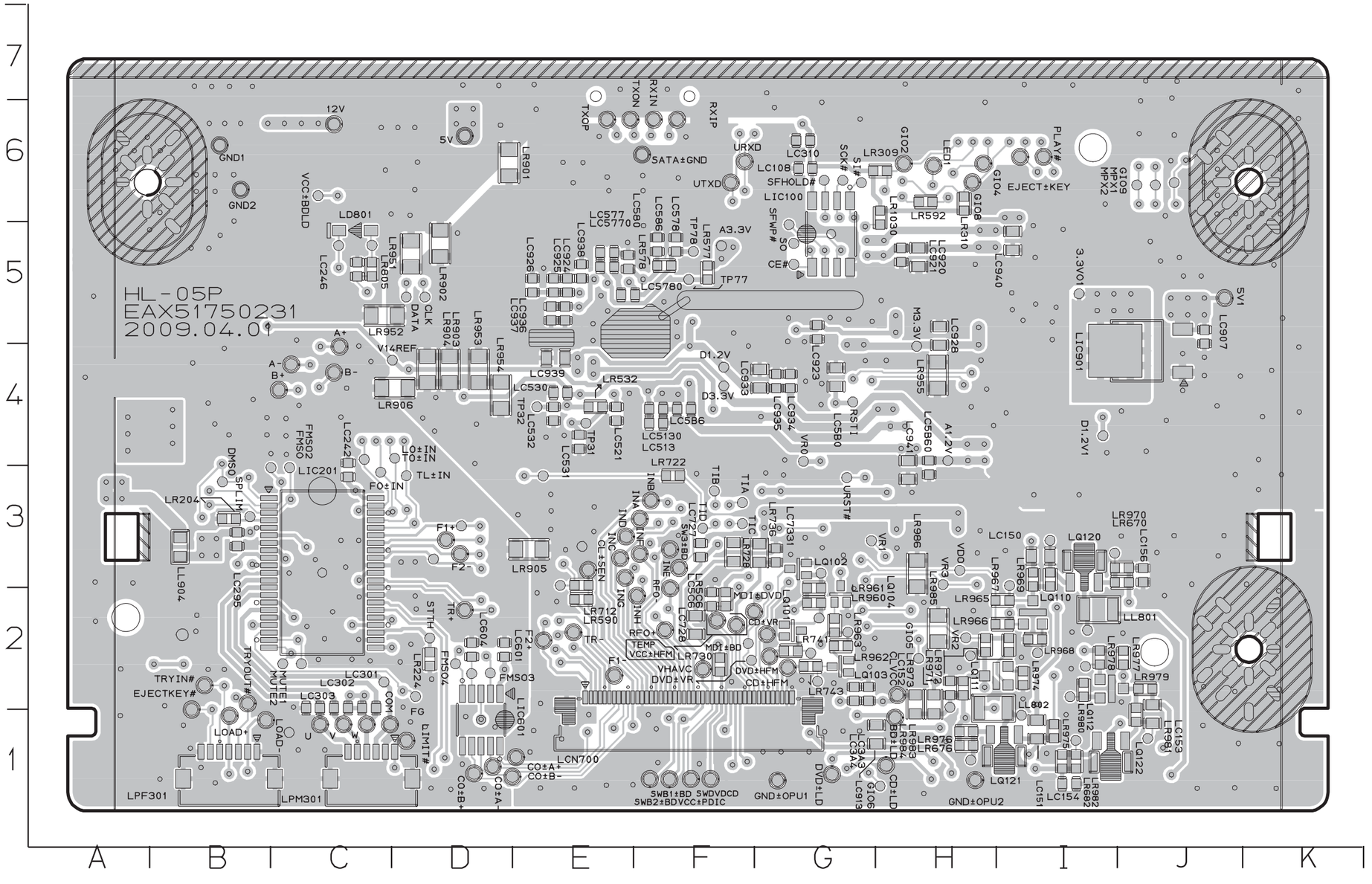
(BOTTOM VIEW)



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